JPRS-ULS-92-005
11 FEBRUARY 1992

JPRS Report

Science & Technology

Central Eurasia: Life Sciences

Science & Technology
Central Eurasia: Life Sciences

JPRS-ULS-92-005 11 February 1992

CONTENTS

Environment

Epidemiology

Genetics

Medicine

Pharmacology, Toxicology

Physiology

Public Health

Psychology

Radiation Biology

Veterinary Medicine

Conferences

Miscellaneous

Some Ontogenetic Distinctions of Spanish Licorice (*Glycyrrhiza Glabra* L.) Related to Its Industrial Cultivation

927C0002A Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK in Russian
No 1, Jan-Feb 91 pp 43-47

[Article by A. I. Gladyshev, Institute of Botany, Turkmen Academy of Sciences]

UDC 581.526.631.619

[Text]Spanish licorice is a perennial herbaceous plant, the underground organs of which are represented by well-developed roots and rhizomes which form a complicated, multilayered and deep-rooted system. For a long time it was believed that this plant reproduces in the wild only vegetatively, through the rhizomes. Its roots (with the exception of the hypocotyl node) have no reproductive buds and perish if separated from the parent plant [1, 9].

Licorice shoots and seedlings of different ages were first discovered and described in the bottom land of Amudarya River [8]. As a result of investigation of distinctions of seed reproduction of the plant, the phytocenotic role of licorice in the formation of bottom-land communities and its place in ecosystems of vegetation-covered bottom lands were validated [3, 4].

Seed productivity of licorice in Amudarya bottom land is in the range of 135-1100 kg/ha, depending on habitat conditions and structure of phytocenosis [2]. The seeds are in the hard group, they are capable of sprouting rapidly and well only if their membranes are damaged in some way or other and allow moisture to reach the seeds. The gastrointestinal tract of farm cattle is the "factory" for such treatment of seeds in the wild [8]. The fact that there may be up to 6000-7000 licorice seeds per cow chip, and that sprouts number 1000/m^2 in moist "kairs" where animals graze is indicative of the efficiency of such a biofactory [5, 9].

Once they have initially appeared on markedly moistened substrates in hygromorphic series groups, licorice seedlings form calamus-licorice, reedgrass-licorice, cane [or dandreed]-licorice, reedmace-licorice, eriantus-licorice, wood-licorice and licorice phytocenoses. Generated primarily through seed reproduction, it is only at the next stage of development that these communities acquire the property of active vegetative reproduction as a result of change in ground conditions [3, 4, 9].

Licorice undergoes five main stages in its long life cycle [10].

The first stage is characterized by sprouts and year-old plants (Figure 1). Mass-scale sprouting of licorice is observed in the spring (April-May) and fall (September-October). Maximum yield of viable seedlings does not exceed 65-70/m^2, averaging 10-15. The cotyledonous and axillary buds of the hypocotyl are gradually submerged in soil due to the anchoring capacity of the tap root. The diameter of the root collar does not exceed 0.5-1.0 cm in year-old plants. Lateral offshoots of the primary root reach

Figure 1. Seed sprouting and development of Spanish licorice seedlings in first year

the surface of subsoil waters (50-80 cm). There may be 1-2 indistinct rhizomes branching off the axillary buds. The above-ground shoot (usually there is one) does not exceed 30-40 cm in height.

The second stage refers to 2-3-year plants. It is characterized by active implantation of axillary buds in the region of the hypocotyl, start of formation of horizontal rhizomes and partial shoots (Figure 2). The diameter of the root collar is 1.0-2.5 cm. In the third year of life, the seedlings bloom poorly and set sparse fruit. The height of the

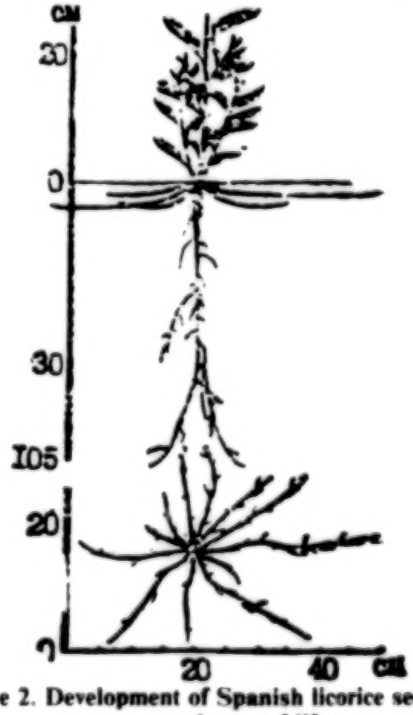


Figure 2. Development of Spanish licorice seedlings in second year of life

above-ground seedlings is 100-120 cm. The biological store of wet phytomass constitutes 4-5 tons/ha.

The third stage refers to 4-6-year plants. This is the period of most active growth and development of horizontal rhizomes, their maximum linear increment and mass-scale growth of more and more new partial shoots (Figure 3). The root system becomes complicate and deepens. The plants bloom actively and bear fruit. There is formation of a licorice community. The biological store of phytomass is 10-15 tons/ha.

The fourth stage refers to 7-10-year plants. There is some slowing of linear increase in rhizomes, with prevalence in them of the process of accumulation of reserve substances. The diameter of roots increases to 4-7 cm and rhizomes, to 3 cm. One observes separation of some rhizome runners from the parent plant, partial shoots develop more slowly, and there is noticeable decrease in green mass yield. Commercial root weight reaches top quality. Biological stock of phytomass constitutes 30-40 tons/ha.

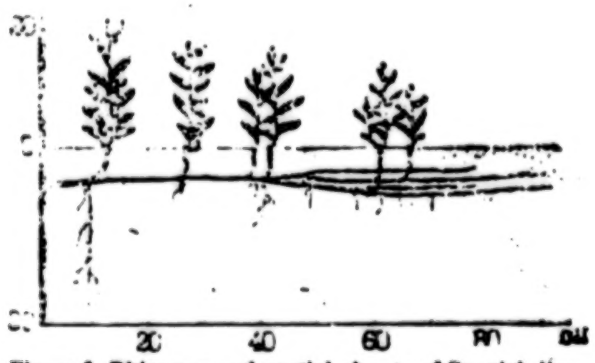


Figure 3. Rhizomes and partial shoots of Spanish licorice in period of active growth

The fifth stage refers to plants that are 11-15 or more years old. Growth and development processes are even less active. The tap root becomes particulate, reaching maximum dimensions and weight. The rhizomes are held in soil by numerous adventitious roots, and their natural separation from the parent plant occurs. The licorice community is completely formed. The tap root gradually dies off. The biological stock of phytomass reaches a maximum, 40-60 tons/ha.

It is difficult to provide an unequivocal answer to the question of maximum life span of licorice seedlings. Statistically processed biometric indicators warrant the statement that the annual increase in diameter of the tap root of licorice plants averages 5.7 mm under the conditions prevailing in the Amudarya bottom land. Since investigators did not encounter roots exceeding 12 cm in diameter, the probable life span of the parent plants was estimated at 20-25 years [10].

However, larger licorice roots are encountered from time to time when licorice overgrowth is plowed. For example, a root 32 cm in diameter at the collar was found in 1966 in the Lavak area, and in the spring of 1988 we witnessed a unique find (Figure 4). A giant root was 40 cm in diameter and its wet weight at a depth of 100 cm was 61 kg. It was about 60 years old (Table 1).

Table 1. Comparative features of largest roots (collection of Soyuzlakritsa VAPO [All-Union Agroindustrial Association] and the giant licorice root

Object described	Diameter (cm)				Air-dried weight at 100-cm depth (kg)	Mean age (years)
	at root collar	at 10-cm depth	at 20-cm depth	at 30-cm depth		
Giant root	40.2	33.4	20.1	18.1	21.4	59
Root No 1	19.3	16.1	12.3	8.8	7.3	28
No 2	12.5	10.4	8.1	6.0	7.0	18
No 3	11.0	7.8	5.3	3.5	3.8	14
No 4	11.0	7.4	5.0	2.8	3.4	13
No 5	8.6	7.0	6.0	4.1	2.8	12

Note: The root diameter was measured at depth of 10 cm to determine mean age.

The capacity of licorice to reproduce actively through seeds was taken into consideration in elaborating steps to improve naturally occurring licorice phytocenoses and raising it as an industrial crop [1, 6, 7]. Nevertheless, when starting new plantations, as a rule an effort is made to use licorice rhizomes, at the rate of 2-4 tons/ha of planting material representing the highest grades of commercial roots.

Plans for future development of the licorice sector of agriculture provide for establishing five licorice sovkhozes [state farms] in Central Asia covering an area of more than 35,000 ha. It will be necessary to procure tens of thousands of tons of licorice roots in excess of the plan for use as planting material. In this regard, we consider it economically more expedient to practice on a broader basis the sowing of licorice plantations with use of seeds.

Figure 4. Tap root of Spanish licorice of unique size at age of about 60 years

In the first year of life, licorice crops require more careful care than at the planting stage. However, under sovkhoz conditions this work does not present any particular problems. It is best to grow licorice from seeds on soil with light and average mechanical composition containing 0.12-0.25 percent salts in solid residue.

In agricultural practice, licorice seed yield is increased by means of scarification, treatment with boiling water or concentrated sulfuric acid. This increases the yield from 16-18 to 95-100 percent. Licorice is planted starting in April, when the soil is warmed to 18-20°C at a depth of 5-10 cm. The quality of soil preparation is also important.

In the first year of life, licorice seedlings required increased and stable soil moisture; for this reason, until 7-8 true leaves appear one should provide supplemental watering as needed. Thereafter, watering depends on the condition of the plants. After watering, before the horizontal rhizomes mature (second half of the summer) inter-row tilling is recommended. In subsequent years, the method of caring for licorice crops grown from seeds does not differ from the one used in areas where rhizomes were planted [5, 6].

When cultivated, seedlings develop the most intensively in the third year of plant life (Table 2). Nevertheless, the first commercial recovery of roots is effected after 4-5 years so that the most viable vegetative parts that will provide for self-renewal of plants will be left in the soil after digging out the roots.

Thus, considering the capacity of Spanish licorice for active reproduction through seeds and high productivity of seedlings, when raising it on an industrial basis it is expedient to make use of plant seeds to the same extent as rhizomes.

Table 2. Yield of Spanish licorice crop under conditions of central Amudarya oasis (air-dried weight of 3-year plants, tons/ha)

Method of reproduction	Above-ground weight	Underground weight			
		roots	rhizomes	total	including commercial weight (percent)
Seed—bottom land	10.1	8.4	6.4	14.8	76
—sand	12.4	12.0	10.7	22.7	86
Rhizome—bottom land	10.4	4.3	13.5	17.8	73
—sand	13.1	15.0	13.5	28.5	86

Note: Commercial weight refers to air-dried roots and rhizomes more than 0.7 cm in diameter.

References

1. Gladyshev, A. I., "Bioecological distinctions of Spanish Licorice as Related to Raising It in the Bottom Land of Amudarya River," author abstract of candidatorial dissertation, Ashkhabad, 1967, 22 pages.2. Idem, "Seed Productivity and Spanish Licorice Seed Yield in Phytocenoses of Amudarya Bottom Land," "Tez. dokl. simpoziuma po

izucheniyu i ispolzovaniyu solodki v narodnom khozyaystve SSSR" [Summaries of Papers Delivered at Symposium on the Study and Use of Licorice in the National Economy of the USSR], Ashkhabad, Ylym, 1969, pp 36-38.

3. Idem, "Amudarya Bottom-Land Vegetation. Current Status, Ecology, Productivity, Protection and Judicious Use," author abstract of doctoral dissertation, Leningrad, 1986, 33 pages. 4. Kerbabayev, B. B., "Dzhangil [?] Vegetation of Amudarya Bottom Land," TR. IN-TA BIOLOGII AN TSSR. SER. BOTAN., 1954, Vol 1, pp 22-74.

5. Kerbabayev, B. B., and Gladyshev, A. I., Turkmenskiy lakrichnyy koren" [Turkmen Licorice Root], Ashkhabad, Ylym, 1971, 94 pages.

6. Kerbabayev, B. B., Gladyshev, A. I., and Keldzhayev, P. Sh., "Puti uluchsheniya yestestvennykh solodkovykh fitotsenozov i vvedeniya solodki v kulturu" [Means of Improving Natural Licorice Phytocenoses and Raising Licorice as a Crop], Ashkhabad, TurkmenNIINTI [Turkmen Scientific Research Institute of Scientific and Technical Information], 1986, 39 pages.

7. Kerbabayev, B. B., Gladyshev, A. I., Keldzhayev, P. Sh., and Geyushova, T. M., "Kultura solodki v Turkmenistane" [Licorice Growing in Turkmenistan], Ashkhabad, Ylym, 1989, 191 pages.

8. Kerbabayev, B. B., and Kashchenko, V. A., "Growing Licorice (Glycyrrhiza glabra L.) From Seeds in Amudarya Valley," IZV. TFAN SSSR, 1949, No 2, pp 44-49.

9. Nadezhina, T. P., "Some Questions of Blooming, Fruit-Bearing and Reproduction From Seeds of Spanish Licorice (Glycyrrhiza glabra L.) in Amudarya Bottom Land," "Rasteniya—istochniki biologicheski aktivnykh veshchestv lechebnogo deystviya" [Plants as Sources of Biologically Active Therapeutic Substances], Moscow-Leningrad, Nauka, 1965, pp 110-140.

10. Idem, "Data on Structure of Underground Organs of Spanish Licorice (Glycyrrhiza glabra L.) Inhabiting Bottom Lands," Ibid, 1965, pp 141-164.

Soviet Union Lags in Microbiological Protection of Crops

927C0057A Moscow ZASHCHITA RASTENIY in Russian No 2, Feb 91 pp 3-5

[Article by T. N. Fomenko, under rubric "Problems, Research, Opinions": "The Microbiological Method Needs Support"]

[Text]We like to talk about priorities. Remember the good old days when "We were the very first! We are the very best!"? This tradition is retained to this day. True, we are far from exuberance in the present search for priorities, much is being started for the first time, but what next? Thousands of obstacles, problems and difficulties leave us more often far behind our partners in the West.

This applies fully to introduction of the microbiological method in plant protection practice. For the sake of fairness, it is worth stating that development of this direction began in the USSR on a national level in the mid-1970's, earlier than anywhere else in the world. Of course research had been carried out even before that, but it is expressly 15 years ago that they were legitimized by a number of directives and decrees dealing with development of production of biological agents, including microbial pesticides. In those same years, this direction was considered virtually the most promising one for biological protection, and according to forecasts, which are still being confirmed by the developments of research institutions, the required scope of utilizing biologicals is in the range of 10-12 million hectares. We should have reached this goal as far back as the mid-1980's. But we did not.

In the West, however, it is only in the last 2-3 years that serious attention was given to this method, primarily its commercial possibilities. They started intensive organization of production and use of biopesticides. At the present time, such agents constitute 1-5 percent (according to different sources) of all means of plant protection in the United States. However, there are plans to raise this figure dramatically in the next 10 years, to 50 percent. And, as shown by life, most often what is planned in their "non-planned" economy is most often fulfilled.

Not only small firms, but also major chemical concerns, such as Monsanto, Ciba-Geigy, Du Pont, Sandoz joined in the work to organize production of microbiological agents, and allocate considerable funds for this purpose.

In our country, in spite of the rosy prospects, the scope of use of biologicals has stabilized at 2-2.5 million ha annually (i.e., one-fifth the planned level). And in recent years there has been gradual decline in their use: while the figure was 2.5 million ha in 1980 (this was the peak), by 1988-1989 we dropped to 2.1.

What then is the reason for the slowdown in this area? This problem became the subject of discussion at the second symposium of CEMA member nations on microbial pesticides, which convened in late October 1990 in Protvino, a suburb of Moscow. The All-Union Scientific Research Institute of Applied Microbiology was the principal organizer of this meeting. It should be stated right away that an international meeting did not occur. Our colleagues from countries of East Europe were unable to come for many objective reasons that we understand (but their papers were included in the collection of summaries prepared for the symposium). On the one hand, it is a pity that, because of this, it was not possible to have an exchange of opinions with scientists from Poland, Bulgaria and Czechoslovakia, as expected by the organizers. On the other hand, it was high time to break up CEMA, which is a largely contrived, very limited and, incidentally, already disintegrated organization, and to join in the worldwide process of microbiological research.

The fact that it turned out to be an all-union symposium has positive sides. We were able to stop and look around: Who are we? What have we achieved in science? How is introduction advancing? What are the prospects? The

scientific papers were grouped in three sections: 1) "Screening of naturally occurring and designed strains of bacteria, fungi, viruses promising as pesticides"; 2) "Technological and economic aspects of biopesticide production and use"; 3) "Standardization and methods of rating the quality of pesticides."

Papers were delivered by scientists from the All-Union Scientific Research Institute of Biological Methods of Plant Protection, All-Union Institute of Plant Protection, All-Union Scientific Research Institute of Genetics, All-Union Scientific Research Institute of Applied Microbiology, Scientific Research Institute of Biology (Irkutsk), All-Union Scientific Research Institute of Molecular Biology (Koltsovo), Belorussian Scientific Research Institute of Plant Protection, SibNIIZKhim [expansion unknown, Siberian Scientific Research Institute of Chemical Protection?], All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, SK NIIF [expansion unknown, Special Committee of Scientific Research Institute of Physiology or Physics?], specialists from Soyuzselkhozkhimiya [All-Union Production and Research Association for Agrochemical Services to Agriculture, Academy of Agricultural Sciences imeni Lenin, and many other organizations and institutions. In addition to purely scientific problems, the symposium participants discussed general problems of development of the microbiological method under the present difficult economic conditions, and they exchanged opinions about the future. To sum up all that was said at the symposium on this score, we can single out several sore points in our science and practice.

The first problem is the unfortunate system of industrial production of biologicals. As in other sectors of the economy, a supermonopolism developed here, with dictates from a very small circle of producers with respect to quality, assortment, prices, etc., as well as super-concentration of production. As a result, producers are cut off entirely from consumer needs, and thus far efforts to connect these two elements somehow have failed. To continue the comparison to the United States, we have only to recall that over there all manufacturing, including pesticide production, is decentralized to the utmost. We have less than 40 chemical plants, and they have almost 900. The same applies to production of biologicals. And in each specific region, between producer and consumer there is a large group of middlemen whose task is to take this products, provide them with scientific and technical reinforcement on a consultation basis and see that a specific farmer receives them.

In our country, however, a handful of plants is involved, from which products are transported "from Moscow to the farthest outlying regions." Such a system is devastating for the vast majority of pesticides, which have a short shelf life and rapidly lose their efficacy. As applied to our country, no doubt the correct route would be to implement the regional principle of production, decentralize plants for different oblasts differing in climate and having a specific assortment of farm crops.

Incidentally, it is not only industry that is suffering from monopolism. It is also holding back the solution of scientific problems, when individual institutes develop directions and technologies of biopesticide production that they have adopted without allowing advancement of competition offering alternatives.

This first cause determines others. First of all, the inadequate assortment of biologicals and their poor quality. We are referring, of course, to the agents that are already in production, and not to the arsenal of scientific developments which is quite large in our country. A tentative list of biopesticides that agriculture would like to get numbers at least 25 titles. They include agents developed as far back as the early 1960's-1970's, but production has still not been set up properly. Several scientific problems are involved here, but the main stumbling block is the lack of concern on the part of producers in expanding the list and sufficient profitability of agents that are being produced at the present time.

Recently, expansion of the list was also hindered by the ecological "boom," the desire to close all enterprises, the name of which included chemistry or biochemistry, without going into the methods and purposes of the latter.

As for the quality of biopesticides, like the forms in which they are prepared, it remained on the level of the earliest developments. This is particularly noticeable when we compare them to foreign analogues. For example, novodor, which is less effective than bitoxibacillin, is in great demand at collective and state farms of Russia only because its liquid form is convenient to use. And it is very difficult to prepare a stable solution from our dry bitoxibacillin powder under conditions prevailing in agriculture. That is why they refuse to use it.

The third very important factor delaying introduction of biologicals is the prices. In recent years there was a favorable trend, a gradual slight decline of prices. For example, they were reduced by about 30 percent in 1987, and this promised to give impetus to broader use of biopesticides. This did happen to some extent: there was an increase in use of industrial bacterial products. But on the whole no appreciable changes occurred. Why? Apparently because, in spite of this price drop, virtually all of the biologicals produced are not as profitable as chemicals with analogous action, which are used on the same crops, and they are also inferior to entomophages. Moreover, biopesticides are virtually unprofitable when used on crops for which they are the most effective, we refer primarily to grain and fodder crops, i.e., those that have a relatively low purchase price. As for other crops (grapes, fruit), the products are not effective enough. Under such conditions, one wonders whether use of biopesticides should be increased. Still, the moving force of any industry is income. If farmers grow clean crops and suffer losses, they could not last long practicing such charity.

The fourth problem that we have already mentioned in passing is competition between biologicals and other agents, first of all entomophages, within the very method of biological protection of plants. Unlike biopesticides, a rather broad and ramified system has developed for production of insects, and it is very close to the consumer.

This competition is particularly vivid in Central Asia, where farms have been the main consumers of bacterials since the mid-1980's.

The fifth problem, the difficulty of introducing new products, has two aspects. In the first place, there is the psychological factor. It is no secret that biological pesticides have rather slow action, and they do not elicit an immediate effect, unlike chemical agents. Restructuring is proceeding with great difficulty among farm workers in this respect. In the second place, it is impossible to provide comprehensive protection to crops using biologicals, and this is directly related to the very short list of agents produced and delivered. If one has to resort to insecticides to protect crops anyway, expenses for biologicals make no sense.

Such is the situation that exists today. Is there a solution?

The forecast is not too optimistic, especially in the period of transition to a market economy. What is "hurting" us now and will continue to hurt even more are the uncontrolled product prices. The new tariffs already slated by the State Committee for Prices provide for a mean 35 percent rise in prices of microbiological agents (versus 23 percent for chemical ones). We are on the verge of changing to prices that will be set directly by the seller and buyer. Unfortunately, this has already had a negative effect on biopesticide use. According to the data of Soyuzselkhozkhimiya, there has been dramatic reduction in contracts for 1981 [sic] and orders for such products. And if some effective steps are not taken, the practical use of such agents will be reduced to a minimum.

In general, there has been a tendency in recent times toward decreasing use of any agents for plant protection, i.e., a desire to reduce expenses for steps that do not provide visible and immediate results. This applies, first of all, to the small producers and new farmers who still do not know to what the absence of crop protection could lead.

Another factor that causes us to worry about the future of the microbiological method is the difficulty of financing research. All programs on development of biologicals were officially completed by the start of 1991, i.e., at the end of the preceding five-year period. The prospects for the next years are very gloomy thus far. They are more or less clear concerning research to develop new agents. Such research will be financed, be it minimally. As for technological and applied toxicological programs, they are overlooked, as always. The problem is aggravated by the fact that catastrophically rapid delimitation both within science and in general between republics is taking place at the present time. In the first place, we shall lose technological planning work, and it will be more difficult and slower to make ecological and hygienic evaluations of agents. There are biologicals proposed as far back as the 1960's that have not yet undergone such evaluation, and we need not even mention new ones. If such research is not financed, it will no longer be possible to organize production of biopesticides and recommend them.

Several proposals were offered at the symposium to salvage the microbiological method. In the first place, it is necessary to expeditiously prepare a single inter-republic program for development, use and production of microbiological agents for the protection of plants, with consideration of the current status of science and practice. The second factor meriting attention is to augment profitability and competitiveness of biopesticides. Without this, no matter how much is invested, development of production and use of such agents will fail anyway. There are two reserves in this respect: to lower production costs and improve the form of agents and quality of packaging.

The third problem that must be solved now is to revise the system of producing such agents: bring plants closer to the direct consumer. The bearing toward a market economy at the present time is prompting establishment of regional plants. Demonopolization of enterprises is in the offing, and if we do not begin to implement our plans we may find ourselves with nothing in 2-3 years.

Apparently, it would improve the situation in this sector if it, along with the relevant research institutions, are put under the jurisdiction of agricultural agencies, who are the main customers. It would also be desirable to relegate to them the financing of a future scientific and technological program. Incidentally, the leader for such a program should not be a single institution, but at least three: All-Union Academy of Agricultural Sciences imeni Lenin, which represents the interest of science, Ministry of the Medical Industry, which is the main producer, and Soyuzselkhozkhimiya, which is the consumer of microbiologicals. And they all need support from the bottom up, support of concerned organizations in the struggle to save and develop this sector in the interests of ecology and a clean environment.

Photo caption [photo not reproduced]: Symposium on microbial pesticides. Recess, time for heated discussions. Left to right: N. N. URAKOV, director of the All-Union Scientific Research Institute of Applied Microbiology, P V. NIKONOV, chief of biomethod department of plant protection administration of Soyuzselkhozkhimiya, and N. A. BOZHKO, department chief at the All-Union Scientific Research Institute of Molecular Biology (Koltsovo).

Lyutestsens-72

927C0057B Moscow ZASHCHITA RASTENIY in Russian No 2, Feb 91 p 22

[Article by N.N. Saltykova, head of problem laboratory, Saratov Agricultural Institute]

[Text]This variety (developed by N. N. Saltykova) was produced by interspecific hybridization on a genotypic basis of two winter wheat species, *T. aestivum* (2n = 42) and *T. durum* (2n = 28). Crossing combination: Mironovskaya yubileynaya [Mironovskiy jubilee] X Odesskaya yantarnaya [Odessa amber].

On the basis of results of State crop testing, Lyutestsens-72 has been zoned in Saratov Oblast since 1989 and in Ural oblast since 1990.

The new variety differs from other varieties of bread wheat in drought resistance, resistance to lodging and excellent capacity for accumulating biomass in the fall, and it grows

back well in the spring without producing sterile second growth. Under the conditions prevailing in Saratov Oblast, it matures 3 days earlier than Mironovskaya 808, and it is among the best Soviet cultivars in protein content of flour.

During competitive crop testing in the field (1979-1989), Lyutestsens-72 was insusceptible to wheat and covered smut, or *Puccinia triticina* rust; however, in different years it was more susceptible to powdery mildew than Mironovskaya 808 (unfortunately, the racial composition of diseases is not known to us). Resistance to pathogens was confirmed on many State crop-testing stations.

Main Administration for Chemization and Plant Protection Created

927C0057C Moscow ZASHCHITA RASTENIY in Russian No 2, Feb 91 p 58

[Text]The RSFSR Ministry of Agriculture and Food, G. V. Kulik, issued an order which provides for establishment of the Main Administration for Chemization and Plant Protection as part of the central apparatus of the ministry, assigning the following duties to it:—implementation of agrochemical policies in the matter of scientifically validated use of chemistry in agriculture;—adoption of agrochemical and phytosanitary soil and crop monitoring;—development and implementation of programs for improving soil fertility and integrated systems of protecting agricultural plants on different levels of management of agricultural production;—development and introduction of ecologically safe technologies for agrochemical services in plant-growing and chemization of livestock farming;—implementation of supervision of use of chemicals and agents for plant protection by all farmers, as well as quality of farming, with the rights of republic-level state inspectorate of chemization and state inspectorate of plant protection;—development, in collaboration with the State Agrochemical Association (Agrokhim), balances and plans for distribution of chemical production;—development and refinement of direct economic ties between producers of chemicals and agroindustrial formations, introduction of market relations between them;—determination of future and current needs for chemicals and plant protection agents, organization of delivery to the agroindustrial complex of mineral fertilizers, chemical and biological agents for plant protection, soil reclamation, feed supplements, growth stimulators and others;—development of a reserve for rendering assistance to all categories of farms immediately in extreme situations;—involvement in preparing and financing long-term and annual plans for scientific research, technological planning and experimental planning work;—scientific and methodological guidance of planning and research chemization stations and plant protection stations in effective and ecologically safe use of chemicals;—formation, together with the Glavekonomika [Main Administration for the Economy] and Rosagrosnab [Russian Association for Agricultural Supply], of the material and technical base for chemization, furnishing specialized engineering, warehouse and other equipment, completely outfitted rayon-level and farm agrochemical and biological laboratories;—functions of an agency organizer of the metrological supply service in agrochemical servicing of agricultural enterprises.

Planning and research stations for chemization and plant protection stations should be transferred as of 1 January 1991 to the direct jurisdiction of agroindustrial formations of autonomous republics, krays and oblasts in order to improve their performance radically, bearing in mind that the Main Administration of Chemization and Plant Protection provides methodological guidance.

Glavekonomika is to examine the matter of increasing financing work performed by chemization stations. Financing of the state service of plant protection on the basis of a state budget is to be retained.

It should be recommended to agroindustrial formations to convert rayon integrated technological laboratories into affiliates of republic (ASSR), kray and oblast chemization stations.

Agropromkhimiya [Agroindustrial Chemistry] and Selkhozkhimiya [Agricultural Chemistry] oblast and rayon associations should be made responsible for timely and appropriate agrochemical servicing, timely delivery of mineral fertilizers, pesticides and other chemicals in the amounts and assortment stipulated in contracts and requests of farmers.

A board for plant protection (headed by I. K. Ryabchenko) was formed as part of the Main Administration.

Natural Vegetation Resources of Turkmenia Mountains and Their Judicious Use

927C0079A Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK in Russian No 2, Jan-Feb 91 pp 3-8

[Article by A.I. Gladyshev and G.L. Kamakhina, Institute of Botany Turkmen Academy of Sciences]

UDC 615.322.582(575.4)

[Text] Questions of judicious use of natural resources under conditions prevailing in Turkmenistan have their own specifics and are always related to social aspects and ecological stress. The ecological distinctions of this republic, due to aridity of the territory restrict exceeding the bioecological potential of plants in desert ecosystems. This is manifested not only with respect to rare or conditionally rare plants, but also resources that occupy relatively large areas and are notable for considerable biomass.

Our objective here was to make a preliminary assessment of the resource potential of useful and promising wild plants in the mountainous part of Turkmenia on the example of Central Kopetdag. Our analysis also serves as a preliminary forecast of comprehensive phytocenotic investigations of the vegetation of Kopetdag and its utilization on a resource-conserving basis in the spirit of the all-Union program entitled "Biological Resources: Judicious Use, Reproduction and Protection."

In the current interpretation, biological resources refer to the system of biotic resources (objects in living nature serving as the source of existence of man with environment-protective and social functions, in addition to serving as raw materials), which can be used by man without detriment to his environment [3]. In this regard, the ultimate task for the proposed research is to elaborate scientifically validated methods for judicious use of natural vegetation resources of the mountain ecosystems of Turkmenistan, that would create stable prerequisites for improving the habitat and increasing the ecological optimum, which helps restore the utilized vegetation.

Natural factors, combined in a complex manner with the landforms of vast plains, mountain systems, foothill plains and river valleys, created conditions for the formation and development of distinctive and, in many respects, unique vegetation in this republic. For example, there are six distinct landform complexes in Central Kopetdag: —high-altitude interfluval plateaus and upper parts of slopes;—debris and erosional scaly slopes, edges of deep canyon-like ravines and narrow gaps;—bottoms of deep ravines and banks of mountain rivers and springs;—gently sloping turf-covered slopes;—open arid intermountain valleys;—foothill plain.

The following arid florocenotypes are of predominant importance in these complexes in the multidimensional structure of vegetation: deciduous forests, deciduous bushes, ephemeral vegetation, semi-savannas with tall grassland, steppes, tragacanths, steppe shrubs, etc. [4]. They also determine the specifics and nature of distribution of resource plants in mountainous ecosystems.

The vegetation resources of Turkmenia are represented by food, drug, technical, fodder and other groups of higher flowering plants number no more than 400 promising species. The wealth of species diversity of useful plants increases from flat to mountain regions in accordance with the patterns of the arid zone of Asia [2]. Thus, while more than 60 percent of the republic's flora (about 1680 species) is concentrated in the mountainous part of Turkmenia, there is a total of 2100 species in all of the Turkmen-Khorasan mountains. The flora of Soviet Kopetdag numbers 1766 species, including 1387 in Central Kopetdag, 1100 in Northwestern and 1150 in Southwestern [4]. Angiospermae constitute the basis of Central Kopetdag flora, with increasing role of dicotyledonous species and noticeable polymorphism of different groups genera and families. Monotypic and floristically poor genera constitute half of all flora species. With regard to profusion of species, the following genera stand out: Astragalus (61), "kuzinia" [?] (29), onions (25), spurge (17) and others. There is a total of 19 polymorphous genera. There is numerical prevalence of herbaceous polycarpous plants (45.3 percent of the flora), many annuals (34 percent) and very few trees (1.8 percent) and shrubs (11.5 percent). These are the typical features of the flora of arid territories with somewhat turf-covered slopes and predominant development of herbaceous plants. Species with a tragacanth-type of life form and the form of pulvinate plants lend uniqueness to the flora.

While there is predominant importance of ancient and East-Mediterranean roots in the flora of Central Kopetdag, a typical features is the abundance of Iranian, mountain- and central-Asian species with a high percentage of endemic species (16 percent). This feature causes the diversity of the composition of promising resource plants, which have not yet been sufficiently investigated in the pharmacochemical aspect.

The flora of Kopetdag, born in the womb of tertiary ancient-Mediterranean flora, which has undergone in its development all of the elements of the flora of mountainous Central Asia, acquired its contemporary original image that is related today, to a significant extent, to powerful anthropogenic activity. The increasing inclusion of semifrutex cenoses, with actively progressive development of semi-savanna flora, mountain steppes and tragacanths, emerge as indicators of regression of the vegetation. In this regard, one of the distinctions of the Kopetdag flora, noted by M. G. Popov, where the "individual, species-specific factor advances to the fore and the species becomes the main botanical and geographic unit is acquiring increasingly great importance, since a species is not only a specific morphological form, but also a specific ecological and, consequently, botanical-geographic set of individuals...." [12]. The species becomes the starting point, upon which depends its role and feasibility of resource development. However, in our times, it is expressly the species that is subject to the utmost anthropogenic impact. With the low species concentration of the flora of Central Kopetdag (288 ha/species), uncontrolled anthropogenic factors often have unpredictable negative effects.

In mountainous Turkmenia, as in all Central Asia, centuries of tree-felling, fires and excessive grazing have inflicted irreplaceable loss of tree plantations (first of all, junipers and Pistacia). As a result the areas with junipers in Kopetdag are constantly reducing in size, and in most cases there is no stable renewal of junipers. Even the ancient orchards of walnuts are threatened with extermination. At the same time, forestry practice in the area of utilization and reconstruction of junipers and other valuable lignaceous shrubs has not yet solved the problem of artificial forestation of mountain slopes and other degraded regions. One should not overlook the fact that nut trees of mountainous Turkmenia are, at the same time, important sources of biologically active substances, and they are promising for cultivation as medicinal plants. All species of Kopetdag hawthorns and barberries are rich in biologically active substances. The medicinal properties of three species of Kopetdag ash [Sorbus] are not known as yet. It would be promising to investigate different species of Inula, immortelle, Ferula, Dorema and many others.

Among the resource species of Central Kopetdag, shrubbery plays a noticeable part, although its use at the present time is limited solely to processing dog rose fruit, which amounts to 1-2 tons/year. The fruit of Rosa canina, R. beggerrana and R. corymbifera are an excellent source of multiple vitamins. The raw material dog-wood resources in this republic and projection of their productivity have not been sufficiently investigated.

The firs of Kopetdag are economically important, in particular, Ephedra equisetina is a valuable medicinal plant. The ephedrine contained in its above-ground mass is similar in structure and properties to adrenalin, but notable for great stability and long action, with insignificant toxicity. There have been no studies of the stock of raw material and methods of judicious exploitation of dense fir stands [9].

Species of the genus Acanthophyllum, a source of raw material of the Turkestan soapwort, is included in the mountainous ecosystems of Turkmenia. In the course of long-term exploitation and anthropogenic influence, there has been considerable depletion of the reserves of A. glandulosum and A. mucronatum raw materials in Kopetdag, and of A. gypsophylloides in Kugitanga. In this regard, there have been studies of the biology and dynamics of replenishment of industrial species of Acanthophyllum of Kopetdag [10, 11], and procedures for industrial cultivation of A. gypsophylloides have been developed for the unirrigated zone of the Kugitangtau chain.

The dense growth of traganth astragalus is of great economic interest in Kopetdag. Long-term procurement of Astragalus turkmenorum and A. pulvinatus gum without following any system has led to depletion and alteration of the structure of this unique group of plants. Resource-specific research carried out on the Solyukli-Prokhladnenskiy mountain mass have revealed only partial restoration of industrial overgrowth of tragacanths, although more than 30 years have passed since gum procurement was stopped.

In recent years, there has been considerable increase in the importance of Artemisia as a resource. Being good essential-oil containing plants, they began to be used extensively as constituents to produce original nonalcoholic beverages, and they are traditionally contained in the formulas for a number of well-known fine wines and balsams. In Turkmenia, Artemisia kopetdaghensis, A. balchanorum, A. turcomanica and others are used for this purpose. The possibilities of procurement of Artemisia raw materials for the food industry are virtually unlimited. Nevertheless, each species of Artemisia requires elaboration of special instructions on how to procure raw materials and make long-term forecasts of productivity as related to the climate conditions in the course of the year.

At the present time, the food industry of Turkmenia utilizes raw materials from 53 species of wild plants and cultivated flora, 42 of which are in Central Kopetdag. However, the species resource potential of Kopetdag flora is considerably broader. We can mention caraway, wild parsley, British inula, subdentate Senecio [ragwort], common sowthistle, flixweed [Sisymbrium sophia L.], forest whitlow, thorny atraphaxis, lady's bedstraw and many others as regional plants that are promising for investigation and use.

The priority of medicinal grasses among the useful wild plants of the Turkmen flora is unquestionable. In spite of the great advances made in the area of synthesis of drugs, drugs derived from plants still hold an important place in modern scientific and folk medicine. Of the medicinal flora of Central Kopetdag, medical practice has been offered 40 species as sources of raw material for official drugs [4]. Some plants (black henbane, lesser meadow-rue, harmel, knotweed, coltsfoot, dandelion, greater plantain, milfoil) are widely distributed in other regions of the country [15]. There is another group that constitutes an unquestionable priority of our flora. Ephedra, briar, St. John's wort, dyer's madder, ribwort, horse mint, milfoils, drupaceous scruff-pea, common stinging nettle, peachwort [or redshanks], common melilot, Spanish licorice, hemlock, centaury, sage, dead nettle, white bryony, common globe thistle, common fig, Armenian marsh mallow and others should be submitted first to investigation as resources. Unfortunately, there are no standards or specifications for many medicinal grasses used in scientific medicine and long-used in folk practice (common apricot, elongated quince [apple quince?], hawthorns, spinous capers, Turkmen juniper, black-berried nightshade, mother-of-thyme, creeping puncture vines, cuneate-leaf Ziziphora, cudweed-like fleabane and others), which makes it difficult to use them in orthodox medicine.

The uniqueness of Kopetdag flora, with a high saturation of endemic species and Khorasan-related species make it possible to expand the assortment of plants suitable for scientific investigation for use in this republic's national economy. The most promising ones are: trispheric "ungerniya" (loess slopes of East Kopetdag foothills), Aryan Ornithogalum (most common in East Kopetdag, endemic), Kopetdag immortelle (Central Kopetdag, endemic to Khorasan-Kopetdag), Persian ash [Sorbus] (Sarymsakli, Missinev, Karayalchi, isolated trees), Turkestan ash (Missinev, Taze-Takhte gorge, Khirs-dere, total of 133 trees), Luristan ash (Missinev, Taze-Takhte, total of 45 trees). We could add to this list: valerian, buckthorn, Kabul "harelip" ["zaytsegub"], mullein, inula (all species), dark-colored currant, ragwort, Colchicum, Komarov shield fern, "rosette" [rozetochnitsa] and many other rare species, for which cultivation methods will be developed if necessary. From the standpoint of the conception of improving the structure of the diet of the inhabitants of this republic with respect to the most valuable items, investigation of honey-bearing plants of Kopetdag, which constitute one-third of the species in its flora according a a preliminary estimate, is acquiring much importance. Nor can one fail to pay attention to dye-bearing plants. A total of 128 species of plants in this republic could be included in the recovery of 60 tons of dye for thread, fabrics and leather [14]

In view of the growth in ecological and social problems of resource use, at the present time importance is being given to methodological approaches to evaluation of the resource potential of plants. At this stage some new requirements have been formed for management of resource work, the most important of which are: —simultaneous and complete coverage of all main resource parameters for a concrete plant species;—elaboration of effective practical steps to protect dense plantations of the species under study;—provisions for forecasting the stock of raw materials of a given species;—routine use of telemetric methods and materials in the study of reserves of raw materials [7].

It has become of paramount importance to identify the structure of the ranges of distribution of useful wild plants. The fact of the matter is that, along the periphery of the area

of its distribution, each species is rather scarce and industrial procurement could destroy concentrations thereof. However, there are sections within the range where a species flourishes and, provided judicious procurement is organized, it can renew itself rapidly. These regions were named "cenoranges" [6, 8]. A most important practical conclusion is derived from this: one of the prerequisites for conservative exploitation of useful plans is to find stocks of plant raw material within the cenoranges. It is much simpler, faster and cheaper to determine their boundaries than to map their entire territory [8]. It is expressly with such an approach that one can combine various forms of judicious use and protection of useful plants.

Plant raw materials are procured within a cenorange only after determination has been made of maximum permissible harvest of the growth, after removal of which there is guaranteed preservation of the population of a given plant. A topological base on a 1:25000 scale, no finer than 1:50000, is used to map the cenoranges. To obtain a general idea, a map to a scale of 1:1000000 is used. In the case of scattered or sparse growth of a species, it is desirable to tag it. In a concrete field situation, the methodological approaches are selected in accordance with the object of investigation, and they do not preclude the use of elements of different concepts [1, 7, 15].

To sum up this brief analysis of the resources of useful wild plants of mountainous Turkmenia, we must call attention to their unique qualitative composition, development of which must be obtained in view of the immeasurably greater demands for judicious exploitation of useful plant stands, and providing for their protection. Multilevel use of plant resources in the presence of modern technologies is possible only by making a compromise, where they are exploited conservatively with preservation of the environment [13]. For this reason, each plant community, each plant species require individual and in-depth investigation in order to develop scientifically validated methods of using them judiciously. Comprehensive investigations of the vegetation of mountainous Turkmenia will ultimately make it possible to undertake formation of a special data bank (cadaster) of the main phytocenotic indicators of resource plants for practical use and implementation of ecological monitoring.

References

1. Borisova, N. A., and Shreter, A. I., "A Method of Determining the Reserve of and Mapping Medicinal Plant Raw Material Resources," RAST. RESURSY, 1966, Vol 2, No 2, pp 271-277.

2. Gunin, P. D., and Neronov, V. M., "Ecological Guidelines for Protecting the Gene Pool, and Problems of Organizing Monitoring of Depletion in the Arid Zone of Asia," "Itogi i perspektivy zapovednogo dela v SSSR" [Advances and Prospects of Sanctuary Work in the USSR], Moscow, Nauka, 1986, pp 172-193.

3. Ilyina, L. N., "Geograficheskiye problemy bioresursovedeniya" [Geographic Problems of Biological Resource Management], Moscow, Nauka, 1982, 191 pages.

4. Kamelin, R. V., "Florogeneticheskiy analiz yestestvennoy flory gornoy Sredney Azii" [Florogenetic Analysis of Natural Flora of Central Asian Mountains], Leningrad, Nauka, 1973, 356 pages.

5. Karryyev, M. O., Artemyeva, M. V., Bayeva, R. T., Kiseleva, V. V., Nabizade, L. I., and Onov, A. O., "Investigation and Use of Medicinal Plant Resources of Turkmenistan," "Ratsionalnoye ispolzovaniye rastitelnykh resursov Kazakhstana" [Judicious Utilization of Kazakhstan Plant Resources], Alma-Ata, Nauka, 1986, pp 16-18.

6. Kuvayev, V. B., "Concept of Holorange and Cenorange on the Example of Some Medicinal Plants," BOTAN. ZHURN., 1965, Vol 50, No 8, pp 1121-1126.

7. Kuvayev, V. B., Klyaznika, V. G., and Lukyanov, O. L., "Experience in Organizing and Keeping Records of Medicinal Plant Reserves on the Example of Kirghiz SSR," RAST. RESURSY, 1987, Vol 23, No 2, pp 262-274.

8. Kuvayev, V. B., and Shelgunova, M. L., "Conservative Utilization,' PRIRODA, 1989, No 10, pp 40-45.

9. Mishchenko, A. S., "Data on Biology of Turkmen Conifers," TR. IN-TA BOTANIKI AN TSSR, 1962, Vol 7, pp 61-80.

10. Mishchenko, A. S., "Acanthophyllum Plants of Kopetdag, Their Use and Protection," "Tez. dokl. II nauch. konf. po okhrane prirody Turkmenskoy SSR" [Summaries of Papers Delivered at 2d Scientific Conference on Environmental Protection in Turkmen SSR], Ashkhabad, 1981, pp 74-75.

11. Mishchenko, A. S., Yukhananov, D. Kh., and Kuvayev, V. B., "Acanthophyllus Glandulosum and A. Microcephalus in Central Kopetdag—a Source of Triterpene Glycosides," IZV. AN TSSR. SER. BIOL. NAUK, 1973, No 5, pp 48-54.

12. Popov, M. G., "Main Features in the History of Development of Central Asian Flora," BYUL. SAGU, 1927, No 15, pp 239-292.

13. Sokolov, V. Ye. "Sanctuaries of the USSR: Their Purposes and Tasks," "Itogi i perspektivy zapovednogo dela v SSSR," Moscow, Nauka, 1986, pp 5-13.

14. Shalyt, M. S., "Dikorastushchiye poleznyye rasteniya Turkmenskoy SSR" [Useful Wild Plants of Turkmen SSR], MOIP [Moscow Society of Nautralists], 1951, 221 pages.

15. Shreter, A. I., Krylova, I. L., Borisova, N. A., Kurlovich, L. Ye., and Bocharov, I. V., "Metodika opredeleniya zapasov lekarstvennykh rasteniy" [Method of Determining Medicinal Plant Reserves], Moscow 1986, 50 pages.

Fusion of Artificial Lipid Membranes Induced by a Synthetic "Fusion Peptide" of Arenaviruses

927C0076A Moscow BIOKHIMIYA in Russian Vol 56 No 4, Apr 91 pp 579-588

[Article by S.Ye. Glushakova, V.G. Omelyanenko, I.S. Lukashevich, A.A. Bogdanov, Jr., A.B. Moshnikova, A.T. Kozhich, and V.P. Torchilin; Belorussian Scientific Research Institute of Epidemiology and Microbiology, Belorussian SSR Ministry of Public Health, Minsk; All-Union Cardiologic Science Center, USSR Academy of Medical Sciences, Moscow; Institute of Bioorganic Chemistry imeni A.A. Shemyakin, USSR Academy of Sciences, Moscow]

UDC 577.124

[Abstract] In this work, a synthetic 23-member peptide's ability to fuse lipid membranes was studied. This hydrophobic peptide was an analogue of the authors' predicted functional site—the "fusion peptide"—of the GP2 envelope protein of the Lassa virus (family *Arenaviridae*). The fusion of small monolayer liposomes was detected by the method of resonance energy transfer between fluorescent derivatives of the lipid—the donor (NBD-PE) and acceptor (Rd-PE). The peptide exhibited a pH-dependent fusion activity in liposomes of varying phospholipid composition. The rate and effectiveness of liposome fusion increased when the pH of the medium or the lipid/peptide ratio was decreased or when the temperature was increased. Increasing the ionic strength or concentration of Ca^{2+} ions in the medium inhibited peptide-induced liposome fusion. Neither the charge of the phospholipids nor the transmembrane gradient of protons in the liposome had a marked effect on the kinetics of peptide-induced vesicle fusion. Neutralization of the medium during vesicle fusion slowed the process sharply, while repeated acidification activated fusion, indicating the important role of peptide protonation in accomplishing the studied function. Analysis of the data allowed the authors to hypothesize that acidification of the medium led to a conformational restructuring of the peptide and thereby activated the process of peptide-induced liposome fusion. This activity of the predicted fusion peptide of the Lassa virus was similar to analogous activity in viruses that have a pH-dependent step in the initial stages of viral infection. Further study may yield information on how to block the fusion process in order to prevent a viral infection. Figures 8; references 25: 1 Russian, 24 Western.

Cross Analysis of the Reaction of Insect α-Amylase and Proteinase Components With Protein Inhibitors From Wheat Endosperm

927C0076B Moscow BIOKHIMIYA in Russian Vol 56 No 4, Apr 91 pp 628-638

[Article by Al.V. Konarev and Yu.V. Fomicheva; All-Union Scientific Research Institute for Plant Protection, Leningrad]

UDC 577.151.3

[Abstract] In eight types of insects that damage cereal grain or grain products, the component composition of Nα-benzoyl-DL-arginine-*p*-nitroanilide (BAPNA), acetyl-DL-phenylalanine-2-naphthyl ester (APNE), and α-amylase, digestive proteinases that hydrolyze gelatin, were studied by isoelectrofocusing in polyacrylamide gel (PAAG). With the aid of new "cross" methods, the reaction of α-amylase and proteinase components with protein inhibitors from wheat endosperm was analyzed. Protein inhibitors of α-amylase and proteinase are factors that protect plants from insects and microorganisms. It was shown that the component composition of insect proteinase complexes is characterized by a sharply pronounced species specificity. Components of the spectra differed in their ability to hydrolyze protein and synthetic substrates and in their behavior toward trypsin, chymotrypsin, and thiol proteinase inhibitors. Information obtained by the proposed methods can be used for preliminary classification of individual enzyme fractions prior to more detailed investigations, as well as for evaluating the possible protective role of inhibitors in connection with the mechanisms of digestive hydrolase complexes in various types of insects. Figures 5; references 19: 10 Russian, 9 Western.

Sodium and Proton Pumps in the Respiratory Chain of an Alkali-Resistant Bacillus

927C0076C Moscow BIOKHIMIYA in Russian Vol 56 No 4, Apr 91 pp 733-746

[Article by M.L. Vagina, M.L. Verkhovskaya, V.A. Kostyrko, A.L. Semeykina, V.P. Skulachev, and I.A. Smirnova; Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy (MPNIL), Moscow State University imeni M. V. Lomonosov]

UDC 577.352.4

[Abstract] The ion-transport respiratory chains of subbacterial vesicles isolated from the alkali- and halotolerant bacterium *Bacillus FTU* were studied. It was shown that oxidation of ascorbate by oxygen in the presence of TMPD (N,N,N',N'-tetramethyl-*p*-phenylenediamine) or DAD (2,3,5,6-tetramethyl-*p*-phenylenediamine) redox-mediators was associated with H^+ and Na^+ transport. Uptake of Na^+ was stimulated either by a protonophore or by valinomycin and K^+, whereas H^+ uptake was stimulated by valinomycin but suppressed by protonophores. Diethyl ammonium acetate enhanced the stimulating effect of protonophores on Na^+ uptake and suppressed H^+ uptake. Resistance to HQNO (2-heptyl-4-oxyquinoline-N-oxide) and sensitivity to Ag^+ were associated with Na^+ transport by ascorbate oxidation. Micromolar concentrations of cyanide ($c_{1/2} = 1 \times 10^{-6}$ M) specifically inhibited H^+ uptake without affecting Na^+ uptake. At these concentrations, cyanide caused a 70 percent inhibition of vesicle respiration and complete reduction of type *a* cytochromes. In order to inhibit the remaining respiratory activity and Na^+ transport, the cyanide concentration had to be increased 100 times. At such concentrations, cyanide caused some additional reduction of types *b* and *c* cytochromes. Uptake of Na^+, inhibited by

a high cyanide concentration, could be restored by addition of NADH and fumarate. In this case, Na^+ transport was also stimulated by a protonophore and diethyl ammonium acetate and was sensitive to Ag^+, but it was suppressed by HQNO at low concentrations. It was shown that the NADH:fumarate-reductase reaction could also guarantee H^+ uptake that was resistant to Ag^+ and was suppressed by protonophores and HQNO at higher concentrations. On the basis of obtained data, a hypothesis was developed about two respiratory chains in *Bacillus FTU*, one transporting Na^+ and the other H^+. Each of the chains, differing in sensitivity to specific inhibitors, included a minimum of two points of energy transformation located at the beginning and terminal units of the chains. Indications were obtained of the presence of a common redox-component in the two oxidation paths. Figures 12; references 15: 2 Russian, 13 Western.

Investigation of the Dependence of Phosphatidylcholine Liposomes' Glucose Permeability on Their Prostaglandin Content

927C0076D Moscow BIOKHIMIYA in Russian Vol 56 No 4, Apr 91 pp 747-752

[Article by A.D. Sorokina, N.D. Yanopolskaya, I.M. Bivas, T.L. Yaylenko, and L.I. Boguslavskiy; Institute of Biochemistry imeni A.N. Bakh, USSR Academy of Sciences, Moscow; Institute of Electrochemistry imeni A.N. Frumkin, USSR Academy of Sciences, Moscow; Institute of Physics, Bulgarian Academy of Sciences, Sofia]

UDC 577.352.4

[Abstract] In this work it was shown that introducing prostaglandin E_1 or its synthetic analogue, containing a phenol group in place of the carboxyl group, into phosphatidylcholine monolamellar liposomes led to a strong reduction in the liposomes' permeability to glucose. The analogue of prostaglandin E_1 was more membrane-active. The obtained results correlated with an experimentally determined change in the monolayers' compressibility. A theoretical model that assumed permeability to be proportional to the number of dynamic pores having a diameter larger than the dimensions of a glucose molecule was used to explain the results. Figures 4; references 19: 4 Russian, 15 Western.

Effect of Several Low Molecular Weight Compounds on the Cation-Binding Properties of Cardiac Troponin C

927C0076E Moscow BIOKHIMIYA in Russian Vol 56 No 4, Apr 91 pp 753-760

[Article by R.N. Geguchadze and N.B. Gusev; Biochemistry Division, Biology Department, Moscow State University imeni M. V. Lomonosov]

UDC 577.353.2

[Abstract] The troponin-tropomyosin complex regulates contractile activity of skeletal muscle and the heart. Several low molecular weight organic compounds have been studied as precise regulators of heart contractions. In this work, the effect of several low molecular weight organic compounds on the Ca^{2+}-binding properties of troponin C was studied on models of varying complexity—isolated troponin C, a troponin C-troponin I complex, a troponin complex, troponin-tropomyosin, and myofibrils. Trifluoperazine, calmidazolium, and substance 48/80 increased the affinity of Ca^{2+}-specific centers on troponin C to Ca^{2+} ions both in the isolated protein and in all the more complicated complexes studied. Nicardipine did not affect the cation-binding properties of isolated troponin C, but it increased the affinity of Ca^{2+}-binding centers on troponin C in the complex with troponin I. The cardiotonic compounds APP 201-533 and DPI 201-106 practically did not affect the cation-binding properties of isolated troponin C or troponin C in simple protein complexes. Simultaneously with this, APP 201-533 increased and DPI 201-106 decreased the affinity of Ca^{2+}-binding centers on troponin C fixed in the contractile apparatus of myofibrils. It was concluded that the effect of pharmacological compounds on the cation-binding properties of troponin C can depend on the reaction of troponin C with proteins in the thin filament. To determine the physiological activity of various low molecular weight organic compounds, it is necessary to study their effect on the Ca^{2+}-binding properties of troponin C in protein complexes of varying degrees of complexity. Figures 2; references 28: 3 Russian, 25 Western.

Antigen Structure of the Foot-and-Mouth Disease Virus. VI. Functional Sites of the Immunodominant Region of Protein VP_1 in O_1K and A_{22} Foot-and-Mouth Disease Viral Strains

927C0077A Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 5, May 91 pp 596-605

[Article by V.M. Gelfanov, L.A. Grechaninova, Ye.S. Kan, A.V. Yarov, A.Yu. Surovoy, O.M. Volpina, A.V. Chepurkin, and V.T. Ivanov; Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

UDC 577.112.083.3:615.371

[Abstract] The B- and T-epitopes in protective peptide sequences of foot-and-mouth disease viral VP_1 protein were determined: 136-152 in the O_1K strain and 135-159 in the A_{22} strain. It was shown that upon immunizing various animals with peptide 135-159-A_{22}, antibodies formed that were directed to various sites on the peptide. A correlation was established among the immunogenicity of cleaved fragments of peptide 135-159-A_{22} in BALB/c mice, their effect on isolated T-cells from the mice, and their protective activity in guinea pigs. Investigations were conducted with the aid of synthetic, cleaved fragments of 136-152-O_1K and 135-159-A_{22}. In order to solve problems associated with using these peptides in synthetic anti-foot-and-mouth disease vaccines, the authors concluded that the vaccine should include all potential B- and T-epitopes of the primary immunogenic region and that peptide structures should be designed to include (in addition to the immunodominant region) other immunocompetent foot-and-mouth disease viral sites that can stimulate B- and T-cell antiviral immune responses. Figures 5; references 13: 5 Russian, 8 Western.

Conformational Analysis of Tachykinins. I. N-Terminated Fragments of Substance P, Physalemin, Hylambatin, and Uperolein

927C0077B Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 5, May 91 pp 637-646

[Article by A.Ya. Avanov; Institute of Biochemistry, Armenian SSR Academy of Sciences, Yerevan]

UDC 547.962.541.63

[Abstract] Tachykinins are short peptides of homologous amino acid sequences. They are found in the central and peripheral nervous systems and in the autonomic organs of various organisms—from mollusks to mammals. It has been suggested that this class of neuropeptides is the result of the evolution of substance P (SP), which is found in both primitive organisms and in man. Only recently have other tachykinins been found in mammals. In this work, a theoretical conformational analysis was conducted of N-terminated fragments of the tachykinin peptides substance P, physalemin, hylambatin, and uperolein. It was shown that the number of conformational states of each fragment was fairly limited. The fragments could easily transform from one state to another. The formation of α-helixes by these fragments was precluded; therefore, it is unlikely during tachykinin binding with receptors that the tachykinins' N-terminated fragments could cross the hydrophobic barrier of a membrane's lipid bilayer. The N-terminated sequences probably remain external to the binding site and may participate in the formation of intermolecular hydrogen bonds. Figures 8; references 23: 4 Russian, 19 Western.

Directed Insertion of Amino Groups Via an Internucleotide Phosphate Group During Solid-Phase Synthesis of Oligodeoxyribonucleotides. Synthesis of Biotinylated Oligonucleotide Probes

927C0077C Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 5, May 91 pp 685-689

[Article by V.P. Veyko, K.I. Ratmanova, A.S. Osipov, M.T. Bulenkov, and V.V. Pugachev; All-Union Scientific Research Institute of the Genetics and Selection of Industrial Microorganisms, Moscow]

UDC 577.113.6:577.336

[Abstract] Synthetic oligodeoxyribonucleotides can be used to synthesize probes for use in medical diagnostics and molecular biological research. A variant of solid-phase synthesis of modified oligodeoxyribonucleotides, containing aliphatic amino group-carrying residues inserted via an internucleotide phosphodiether bond, was proposed in this work. Amino groups were inserted directly into a previously determined position during oligodeoxyribonucleotide synthesis. According to the authors, the proposed methodology provided for fast and effective synthesis of oligodeoxyribonucleotides modified at the internucleotide phosphate group. It was shown that the obtained aminoalkyl oligonucleotide derivatives could be used to synthesize non-radioactive tracer probes as well as oligonucleotide-directed reagents. Figures 2; references 16: 4 Russian, 12 Western.

Synthesis of Angiotensin-Converting Enzyme Inhibitors Containing Substituted Quinoline Residues and Study of Their Biological Activity

927C0077D Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 5, May 91 pp 690-696

[Article by M.P. Filatova, N.A. Krit, N.N. Uskova, Ye.M. Maksimova, I.N. Gracheva, and Z. Reissmann; Institute of Biological and Medical Chemistry, USSR Academy of Medical Sciences, Moscow; F. Schiller University, GDR]

UDC 547.964.4' 831.9.057:577.152.343.042

[Abstract] Angiotensin-converting enzyme (ACE) is a key enzyme in two proteolytic systems in the body: renin-angiotensin and callicrein-kinin. Inhibiting the activity of ACE leads to a lowering of high blood pressure, so additional information on the enzyme's structural requirements for substances involved in the enzyme-substrate complex is needed in the search for antihypertension compounds based on ACE inhibition. In this work, angiotensin-converting enzyme (ACE) inhibitors—analogues of the Bz-Phe-Ala-Pro ipeptide where the N- and C-terminated amino acid residues were replaced by 8-methoxy-5-sulfoquinoline and 1,2,3,4-tetrahydroquinoline carboxylic acid residues, respectively—were synthesized. The biological activity of the synthesized compounds was determined *in vivo* and *in vitro*. The enzyme's S'_2 site did not exhibit pronounced specificity to the position of the carboxyl group in the heterocycle in the C-terminated portion of the inhibitor molecule. It was established that inserting modified quinoline radicals into the N-terminated portions of ACE inhibitors did not increase their specific interaction with the enzyme's hydrophobic pocket. Figures 2; references 8: 1 Russian, 7 Western.

Interaction of α-[^{125}I]Latrocrustotoxin With Plasmic Membranes of Nerve Cells From the Crayfish *Astacus astacus*

927C0077E Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 5, May 91 pp 716-718

[Article by V.G. Krasnoperov, O.G. Shamotiyenko, and Ye.V. Grishin; Branch of the Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Pushchino, Moscovskaya Oblast; Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

UDC 591.145.2-544.088:577.354

[Abstract] Neurotoxins that selectively interact with various functionally important components of nerve cells are effective tools for studying the molecular and functional organization of the nervous system. In this work, the authors produced a biologically active derivative of α-latrocrustotoxin (LCT), a crustacean-specific neurotoxin

from *Latrodectus mactans tredecimguttatus* black widow spider venom. They radioactively labelled the toxin with Bolton-Hunter reagent to a specific activity of 160 Ci/mmol and determined the tracer toxin's primary binding parameters to plasmic membranes of nerve cells from *Astacus astacus*. The binding was found to be highly specific with B_{max} = 0.04 pmol bound toxin/mg membrane protein and K_d = 0.7 x 10^{-10} M (B_{max}—density of LCT receptors, K_d—dissociation constant of the toxin-receptor complex). The authors thanked Zh. P. Shuranova (Institute of Higher Nervous Activity and Neural Physiology) for supplying the crayfish and assisting in the research. Figures 1; references 5: 2 Russian, 3 Western.

Asynchronous Expression of Various Members of the hsp70 Family in *Teratoscincus scincus (Gekkonidae, Sauria)*

927C0078A Moscow BIOKHIMIYA in Russian Vol 56 No 5, May 91 pp 874-878

[Article by Kh.A. Ulmasov, V.K. Dashkevich, S.Shammakov, and A. Kh.Babayeva; Institute of Physiology and Experimental Pathology of Arid Zones, Turkmen SSR Academy of Sciences, Ashkhabad; Institute of Zoology, Turkmen SSR Academy of Sciences, Ashkhabad]

UDC 577.122

[Abstract] The synthesis of heat shock proteins (hsp) in *Teratoscincus scincus* liver cells was studied *in vivo* by one- and two-dimensional electrophoresis in polyacrylamide gel. The obtained results verified that in this representative of low-temperature species of lizards, the synthesis of proteins from the hsp70 family is normally (at 25° C) weakly expressed. It is induced only at temperatures exceeding the upper limit of optimum temperatures for this species by 3-4° and reaches a maximum at subcritical and critical temperatures. The identified asynchronous expression of members of the hsp70 family at various temperatures apparently reflects a different contribution by each of these proteins to the body's thermal resistance over a wide temperature range. Figures 1; references 14: 6 Russian, 8 Western.

Kinetics of Immunoglobulin G Transport Through the Multilayer Epithelial-Hematic Barrier of the Respiratory Tract

927C0078B Moscow BIOKHIMIYA in Russian Vol 56 No 5, May 91 pp 883-891

[Article by N.V. Yermakov, B.V. Krekhnov, Ye.Yu. Chenchikova, N.G. Cherchenko, A.G. Ishkov, E.N. Remizova, P.G. Sveshnikov, Ye.V. Miroshnichenko, Yu.V. Nazarov, A.P. Morozov, G.D. Kovalskaya, Ye.V. Artemov, and O.P. Plyushch; Science Center for Molecular Diagnostics, USSR Ministry of Public Health, Moscow]

UDC 577.352.4

[Abstract] A new class of vector drugs is being used for *in vivo* diagnosis and therapy of many diseases. The active substance is conjugated with a vector that transports the drug to specific biological targets. The vector can be a monoclonal antibody or one of its specific components, e.g., the $F(ab)_2$-fragment. Estimation of these vectors' permeability through multilayer and monolayer biomembranes is an important step in analyzing the effectiveness of vector drugs. In this work, the permeability of class G immunoglobulins through the epithelial-hematic barrier of the trachea was shown in experiments on Spraque-Dawley rats. It was established that 5-25 percent of the total number of mouse monoclonal antibodies against swine insulin, injected into the trachea, penetrated into the blood plasma. The process of antibody accumulation in the animals' blood began 4 hrs. and ended 30 hrs. after injection of 400 μg of the preparation. The kinetics of trans-barrier transport were expressed well by an S-shaped saturation function: $f(t) = c_{max}/(1+e^{-(at-b)})$. Simultaneously with the process of monoclonal antibody penetration into the blood plasma and the antibodies' distribution to organs and tissues, the process of immunoglobulin removal (clearance) from the blood plasma occurred; clearance was expressed as an exponential equation: $f(t) = c_0e^{-kt}$. The authors provided an algorithm for the interaction of these two processes that can be used to evaluate the transport of monoclonal antibodies and complexes based on them through biomembranes. The presented experimental approach and mathematical treatment of the results can be widely used in vector diagnosis and vector therapy of various diseases and in measures based on the application of informational or acting agents conjugated with monoclonal antibodies or their vector components. Figures 2; references 15: 6 Russian, 9 Western.

Participation of ATP/ADP-Antiporter and Fatty Acids in Uncoupling Oxidative Phosphorylation in Liver Mitochondria of Gophers During Winter Hibernation and Awakening

927C0078C Moscow BIOKHIMIYA in Russian Vol 56 No 5, May 91 (manuscript received 13 Sep 90) pp 947-953

[Article by N.N. Brustovetskiy, Z.G. Amerkhanov, M.V. Yegorova, Ye.N. Mokhova, and V.P. Skulachev; Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonosov]

UDC 577.23

[Abstract] Characteristics of energy coupling in mitochondria isolated from livers of gophers in a state of winter hibernation and during their transition to the active state were studied. The ATP/ADP-antiporter inhibitor carboxyatractylate reduced the respiration rate, increased $\Delta\psi$ (electrical potential difference at the mitochondrial internal membrane), and reduced the ion conductivity of the mitochondrial internal membrane, which was evaluated by the drop rate in $\Delta\psi$ after adding cyanide to the mitochondria (in the presence of oligomycin and EGTA). Bovine serum albumin (BSA) had the same effect; carboxyatractylate was ineffective on a BSA background. The maximum uncoupled respiration rate and the ion conductivity of the mitochondrial internal membrane were greatly reduced in the hibernating gophers as compared to the

awakening animals. The obtained data indicated that upon awakening from winter hibernation, fatty acids uncouple oxidative phosphorylation with the participation of ATP/ADP-antiporter and that this process occurs in parallel with activation of the respiratory chain. Figures 3; references 14: 3 Russian, 11 Western.

Localization of the Antigen Site on the Tick-Borne Encephalitis Virus Envelope Protein Using Monoclonal Antibodies

927C0093A Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 3, Mar 91 pp 334-342

[Article by N.A. Tsekhanovskaya, L.E. Matveyev, A.G. Pletnev, S.G. Rubin (deceased), I.V. Safronov, and Ye.K. Pressman; Novosibirsk Institute of Bioorganic Chemistry, Siberian Department of the USSR Academy of Sciences]

UDC 578.833.27.083.3:578.74

[Abstract] It was shown upon cleaving protein E of the tick-borne encephalitis virus envelope (Far Eastern subtype, Sofjin strain) with cyanogen bromide that the largest fragment formed, a glycopeptide consisting of residues 78-176 and apparently of molecular weight 14.5 kDa, interacted with five of the 12 studied monoclonal antibodies against protein E. On the basis of results from comparatively analyzing the effectiveness of the interaction of several monoclonal antibodies with Far Eastern and West European subtype viral antigens and a comparison of the primary structures of analogous protein E peptides from these viruses, a hypothesis was made that the binding sites of these antibodies either included residues 89 and/or 116 of protein E or were positioned near these residues. The effects of denaturing agents and reduction with subsequent carboxymethylation on the antigen properties of protein E were studied. Figures 6; references 21: 5 Russian, 16 Western.

Epitope Specificity of Hemagglutinating Monoclonal Anti-A Antibodies

927C0093B Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 3, Mar 91 (manuscript received 25 Apr 90) pp 343-352

[Article by O.Ye. Galanina, Ye.I. Deryugina, M.I. Lapenkov, A.Ye. Nosyrev, Ye.Yu. Korchagina, T.V. Zemlyanukhina, and N.V. Bovin, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow; All-Union Hematological Science Center, USSR Ministry of Public Health, Moscow]

UDC 57.083.3

[Abstract] The epitope specificity of three monoclonal IgM-antibodies (1H10, 3F9, and 44F9) that agglutinate blood group A erythrocytes was studied. The specificity was determined by direct antibody binding with polyacrylamide conjugates of synthetic oligosaccharides and by inhibiting antibody binding with the natural antigen by means of synthetic oligosaccharides and conjugates. It was shown that antibody 1H10 was directed against tetrasaccharide A (type 3) and that antibodies 3F9 and 44F9 interacted primarily with synthetic trisaccharide A, where the contribution of the α-*L*-Fuc residue to binding was insignificant in the case of antibody 44F9. A correlation was identified between the antibodies' epitope specificity and their ability to agglutinate erythrocytes A_1 and A_2. Figures 3; references 20: 5 Russian, 15 Western.

Spatial Structure of the Primary Chain of the Neurotoxin I Molecule From *Naja naja oxiana* Cobra Venom and Its Crystal Packing

927C0093C Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 3, Mar 91 pp 372-378

[Article by A.M. Mikhaylov, A.V. Nikitenko, Ye.V. Chetverina, S.D. Trakhanov, and B.K. Vaynshteyn, Institute of Crystallography, USSR Academy of Sciences, Moscow; Institute of Protein, USSR Academy of Sciences, Pushchino, Moskovskaya Oblast]

UDC 577.322.6:548.737

[Abstract] The structure of the C^{α}-chain of the neurotoxin I (NTX-I) molecule was determined at a resolution of 2.7 Angstroms by the molecular replacement method. NTX-I is one of the components of *Naja naja oxiana* Central Asian cobra venom. NTX-I blocks the neuro-muscular signal by specifically binding to acetylcholine receptors. The toxin crystal was grown by vapor diffusion or by dialysis through a membrane, using specially prepared crystallization cells. The set of X-ray intensities diffracted by the native protein crystal, corresponding to the Fourier spectral region 38-2.1 Angstroms, was collected by the ψ-scan method automatically on a Syntex $P2_1$ diffractometer with four goniometers. Calculations for determining the orientation and unit cell packing of the NTX-I molecule were done on a NORD-500 computer with the MERLOT and BLANC program packages. Figures 3; references 13: 3 Russian, 10 Western.

Gangliosides From *Ophiocoma echinata and Ophiomastix annulosa* Clark Ophiuroidea

927C0093D Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 3, Mar 91 pp 387-397

[Article by N.V. Chekareva, G.P. Smirnova, and N.K. Kochetkov, Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow]

UDC 577.115.5+593.94-147.62.088

[Abstract] Gangliosides from two types of the Ophiuroidea species *Ophiocomidae*, *Ophiocoma echinata* that inhabit the Caribbean Sea and *Ophiomastix annulosa* collected at coasts in Vietnam, were isolated, and their structures were determined by chemical degradation, mass spectrometry, ^{13}C-NMR-spectroscopy, and enzyme treatment with neuraminidase. It was shown that both types of Ophiuroidea incorporated three gangliosides—two major and one minor. In both cases, the major gangliosides were monosialogangliosides with the structures NeuGcα2-6Glcpβ1-1Cer and NeuGc8SO_3(α2-6Glcpβ1-1Cer and the minor gangliosides were disialogangliosides in which the disialyl fragment was bound to glucosylceramide via the O6 glucose residue. The minor ganglioside from *O*

echinata had the structure NeuAc(Gc)(α2-9)NeuAc(α2-6)Glcp(β1-1)Cer. The compositions of the gangliosides' higher fatty acids and sphingosine bases were determined. Figures 2; references 16: 3 Russian, 13 Western.

Gangliosides From *Cucumaria japonica* Semper Holothuria

927C0093E Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 3, Mar 91 pp 398-402

[Article by N.V. Chekareva, G.P. Smirnova, and N.K. Kochetkov; Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow]

UDC 577.115.5+593.96-147.62.088

[Abstract] Two gangliosides, major and minor, were isolated from *Cucumaria japonica* by ion exchange chromatography on DEAE- and TEAE-cellulose (TEAE—triethylaminoethyl) columns and by preparative TLC (thin layer chromatography) on silica gel. The gangliosides' structures were determined by total and partial acid hydrolysis, methanolysis, methylation, enzyme cleaving by neuraminidase, and oxidation by chromic anhydride and a $NaIO_4$-$KMnO_4$ mixture. It was shown that the major ganglioside has the structure N-glycolylneuraminosyl-(α2-6)-glucopyranosyl-(β1-1)-ceramide, and the minor—disialosyl(α)-glucosyl-(β1-1)-ceramide. The structure of the major ganglioside was verified by ^{13}C-NMR-spectroscopy. Figures 1; references 14: 3 Russian, 11 Western.

Monitoring Relationship Between Level of Chemical Use in Agriculture and Psychophysiological Parameters

927C0054B Moscow MEDITSINSKAYA TEKHNIKA in Russian No 2, Mar-Apr 91 pp 12-14

[Article by M.B. Annamukhamedov, B.K. Kudratullayeva, R.D. Ovsyannikova, and O. Annadurdyyeva, Scientific Research Institute for Preventive and Clinical Medicine, Turkmen SSR Ministry of Health, Ashkhabad]

UDC 613.632:[615.275+631.8]:63]07:612.821

[Abstract] The relationship between the extent of chemical use in agriculture and psychophysiological functional indexes was investigated in 231 rural schoolchildren aged 9-14 years that had inhabited the area for at least five years. The children were from two areas of Ashkhabad Rayon that use at least 40 different pesticides and mineral fertilizers. Preliminary data demonstrated that the actual pesticide load in area No. 1 was 1.5- to 2.1-fold higher than in area No. 2, while the nitrate and nitrite load was 1.9- to 2.9-fold higher than in area No. 2. The results took into account age and sex differences and demonstrated that children that inhabited area No. 1 presented with worse psychophysiological parameters. Another study showed that children in area No. 1 had lowered immunological and biochemical resistance, lower succinate dehydrogenase activity, and depressed lysozyme, phagocytosis, and skin barrier function activity. The authors recommend that psychophysiological indexes be investigated during public health examinations held in connection with environmental pollution to identify pre-pathological changes in the central nervous system. Tables 1; references 5 (Russian).

Some Problems of Diagnosing Diseases and Treating Victims During the Chernobyl Nuclear Power Plant Accident

927C0176A Kiev VRACHEBNOYE DELO in Russian No 3, Mar 91 pp 3-6

[Article by L.P. Kindzelskiy, V.I. Klimenko, V.A. Lisetskiy, S.A. Sivkovich and A.P. Kaban, Scientific Research Institute of Oncology, and All-Union Scientific Center for Radiation Medicine]

UDC 614.876:621.039-07-08

[Text] Persons who had participated in disaster relief efforts at the Chernobyl Nuclear Power Plant were subjected to outpatient and hospital examination. The initial examination and the selection process included a radiation exposure history, radiometric data, personal cleansing, repeat radiometry of the regions of the thyroid, chest and stomach, blood cellular composition indicators, and the initial symptoms after exposure and at the time of the visit to the medical institution. Patients who had participated directly in disaster relief efforts at the nuclear power plant and who possessed symptoms of radiation injury were hospitalized locally (in hospitals at evacuation points or in specially designated hospitals in Kiev). After examination and first aid, patients suspected of acute radiation sickness were sent to specialized institutions in Kiev, primary among which were clinics of the Oncology Institute and the Hematology Institute. This choice was based on a number of requirements: presence of specialists with the highest qualifications possessing experience in diagnosing and treating cytostatic disease, including in the presence of radiation pathology; analysis of hemopoietic tissue, and determination of the severity of radiation injuries and their prognosis on the basis of such analysis; use of blood, its components and bone marrow for therapeutic purposes; employment of modern methods of superactive detoxification therapy; presence of conditions preventing intercurrent infection and dynamic dosimetric monitoring. Hematologists and radiologists with the highest qualifications were sent to hospitals at evacuation points on 27 April 1986 so that continuity could be maintained in the stages of health care.

The details concerning the nature of the accident, dosimetric data obtained from people before and after personal cleansing, and the nature of clinical manifestations attested to combined radiation injury, resulting both from external irradiation and from incorporation of radionuclides. The role of the latter was either dominant or significant. This was determined by the presence of radiation-induced dermatitis on exposed skin, mucous membranes of the mouth and the conjuctiva, pharyngitis, bronchitis, chest pains accompanying breathing, and pains along the intestinal tract. Bloody vomiting and diarrhea were noted in a number of patients. Elevated radioactivity in the region of the thyroid, the stomach, intestine and liver was noted as well. These data indicate that radiation injury was the product of several components, and that disease would develop out of a "pure" bone marrow syndrome manifesting itself after one-time external gamma or gamma- neutron exposure.

The difficulties in forecasting the level of radiation injury in each patient were aggravated by the fact that individual dosimetry was not conducted at the time of exposure. We will dwell on patients with radiation pathology that was subsequently diagnosed as acute radiation sickness, and established on the basis of the bone marrow syndrome. Initially these patients were selected on the basis of the place and time of their presence in the radiation zone, presence of primary symptoms (nausea, vomiting, headaches, dizziness, diarrhea), the time of appearance of these symptoms and their duration, change in blood cellular composition indicators, the expressiveness of the signs of radiation exposure and the complaints of the patients.

Therapeutic measures were directed at removing incorporated radionuclides and tissue breakdown products from the patient's body. Persons with elevated radiation levels in the stomach region were subjected to gastric lavage, and to evacuation of intestinal contents, which reduced the radiation level by two to five times. Stable iodine was prescribed with the purpose of reducing reutilization of radioactive radionuclides by the thyroid gland; intensive detoxification therapy using a variant of forced diuresis based on the principle of intensifying water exchange between all of the body's fluid reservoirs was also prescribed. The method of forced diuresis foresaw administering solutions possessing different colloidal and osmotic

properties, in combination with diuretics, with the purpose of removing toxic substances in both intercellular and intracellular spaces.

Intensive detoxification transfusion therapy promoted fast reduction of the manifestations of intoxication after the first cycle of forced diuresis. Nausea and vomiting disappeared, dizziness and headaches ceased, and appetite returned. A decrease in radionuclides in the liver and other organs also attested to the effectiveness of the treatment. After three cycles of forced diuresis, according to external radiometry the concentration of radionuclides in the vicinity of the abdominal cavity and liver decreased by three to five times.

Persons exhibiting elevated radioactivity in the vicinity of the thyroid and admitted to special clinics in Kiev were prescribed stable iodine for a period of 7-10 days. During this period the radiation level decreased by two to four times. Patients were subjected to comprehensive examination over the course of 2-3 days, to include analysis of the blood's cellular and biochemical indicators; functional indicators of the cardiovascular and respiratory systems; X-ray analysis of organs of the thoracic cavity. Bone marrow was analyzed directly by sternal puncture in all patients with reduced leukocyte and thrombocyte concentrations between the fifth and tenth days. Bone marrow was also subjected to histo-autoradiographic and ultrastructural analysis.

Bone marrow indicators were the most informative in assessing the severity of radiation injury and predicting the disease course and the potential need for using donated bone marrow. Antibiotics with a wide spectrum of action were used on 29 hyperthermic patients over a period of 5-7 days. It was subsequently established that the flora of these patients was insensitive to antibiotics of the penicillin group. Moreover dysbacteriosis and reduction of normal intestinal flora were more pronounced in patients who received antibiotics than in those who did not receive them.

Besides medicinal therapy, persons with pronounced phenomena of autonomic vascular dystonia and the neurocirculatory syndrome were subjected to hemodilution followed by forced diuresis. Coronarolytic and cardiotonic drugs, kontrikal and group B and C vitamins were added to the drip tube in accordance with indications. Protein preparations and sodium, potassium and calcium solutions were administered in accordance with indications in order to adjust the blood's protein and electrolyte composition. Such transfusions were prescribed to patients with acute radiation sickness not less than twice a week.

Enterosorbents moderated by potassium, sodium and calcium preparations were given to all patients for 2 weeks. No complications or unpleasant sensations of any sort were observed. Analysis of the results showed that inclusion of enterosorbents in combination with proteolytic enzymes per os into integrated therapy of radiation injuries promoted improvement of the state of patients and of appetite and assimilation of food, reduction of weakness, and disappearance of nausea, vomiting and enteritis phenomena. It was found to be impossible to relieve symptoms of pronounced autonomic vascular dystonia in some patients. Thirteen patients were subjected to hemosorption sessions using Soviet-made sorbents. The indications for hemosorption included growing weakness, discomfort, lack of appetite, pronounced leukopenia ($2.0x10^9$/liter and lower) and so on. Infusion totaled from one to three volumes of circulating blood. Toward the end of hemosorption the protein and electrolyte composition of blood was adjusted, and steps were taken to prevent allergic reactions. Hemosorption was prescribed on the basis of medical indications to different patients for a period of 9 to 40 days after exposure.

Following medicinal infusion therapy and hemosorption, normalization of blood rheological indicators was noted in addition to various degrees of improvement of the overall state of patients: The electrokinetic potential of erythrocytes increased, and blood viscosity decreased, promoting improvement of microcirculation and indicating improvement of metabolic processes in tissues. Other indicators improved as well. The concentration of molecules of average mass in blood serum is known to reflect the expressiveness of the body's intoxication. In patients with acute radiation sickness their concentration increased by 30-120 percent, while after hemosorption it decreased by 10-80 percent. A decrease was revealed in the activity of the kallikrein-kinin system— one of the factors of neurohumoral regulation, and the indicators of nucleic acid concentration normalized. It may be certainly concluded that according to subjective sensations and the clinical and laboratory indicators of acute radiation sickness patients, hemosorption had a pronounced therapeutic effect.

Anemia did not develop in patients entering the clinic 3-5 days after exposure, and consequently erythrocytes were not transfused. Development of leukopenia ($2.0x10^9$/liter) and thrombocytopenia ($30.0x10^9$/liter) was an indication for transfusion of leukocytes and thrombocytes. These preparations made it possible to stabilize blood cellular composition indicators in 1 or 2 days.

In the third week of the hospital stay, manifestations of radiation injury of the skin and mucous membranes were curtailed. Manifestations of the development of dermal radiation burns and changes in mucous membranes were observed in patients who entered the clinic later. Dermal burns were assessed as second and third degree, and they exhibited a tendency to spread. In the first days after exposure to ionizing radiation, dermal erythema was observed at the places of radiation burns. It disappeared spontaneously in 5-7 days, and returned on the 12th-15th days.

By the end of the third week, despite treatment, acute radiation sickness patients exhibited leukopenia coupled with granulocytopenia and thrombocytopenia. Persistent fever was recorded in some patients. Recurrent affliction of the skin and mucous membranes and symptoms of impaired microcirculation in different organs, including the brain, were noted; gastroenteritis and pulmonitis were noted as well.

Therapeutic measures were tailored to the individual. Depending on clinical manifestations and laboratory indicators, the following were prescribed: blood preparations, and on rare occasions, whole fresh blood; detoxification therapy; hemostimulatory agents, anabolic hormones, potassium, calcium, sodium and phosphorus preparations, nootropyl and cerebrolysin as indicated; cardiac drugs; adjustment of blood protein composition etc. Donated bone marrow transplants were carried out in the presence of a reduced blood and bone marrow cellular composition (a total of 11 transplants).

Donated bone marrow was selected with regard for histological compatibility using the HLA, ABO, Rh-Hr system.

Bone marrow transplants were carried out 3-6 weeks after exposure, with regard for inhibition of bone marrow due to incorporated radionuclides. One observation is presented below:

Patient Sh., 35 years old, a senior firefighter. Treated for third degree acute radiation sickness at the clinic of the Kiev Scientific Research Institute of Oncology. Spent 5 hours in the accident zone on 16 April 1986, after which nausea, repeated vomiting, headache, weakness, dizziness, a burning sensation on exposed skin and eyes, and a metallic taste in the mouth appeared. Spent 12 hours at the nuclear power plant on 28 April. Nausea, vomiting, headaches and dizziness recurred, in which connection he was evacuated to Chernobyl, and hospitalized on 29 April in the Ivankovskiy Central Rayon Hospital. For detoxification purposes he was infused with 5 percent glucose solution, gemodez, isotonic albumin solution together with 3 percent potassium chloride, 2.4 percent euphyllin, lasix, dimedrol and vitamins B_1, B_6, C. Potassium iodide was administered as well.

Admitted to the institute's clinic on 1 May. Upon admission, complained of severe headaches, pains in the chest, especially upon inspiration, dryness and tickling in the throat, cough and pronounced weakness. Objective examination revealed hyperemia and edema of skin of the face, neck and hands. Peripheral lymph nodes were not palpated. Pulse—84 beats per minute, with satisfactory quality; arterial pressure—130/80 mm Hg; temperature—37.2°; heart tones rhythmical, muffled. Rigid vesicular respiration above the lungs, no rattle. Palpation of the abdomen was soft, uneventful. The liver at the margin of the rib cage and the spleen were not palpated. Treatment: ampicillin, nystatin, festal, enterosorbent, splenin, vitamins B_1, B_6, C. Condition worsened beginning on 13 May, severe pains appeared in the vicinity of the heart, runny stool, hyperemic and edemic mouth. Condition improved following prescription of colibacterin, festal, riboksin, panangin and gargling with a solution of chlorophyllin and romazulan.

Blood (1 May): erythrocytes—4.50^{12}/liter, leukocytes—$3.1x10^9$/liter, neutrophils—73 percent, eosinophils—4 percent, basophils—1 percent, lymphocytes—15 percent ($0.465x10^9$/liter), monocytes—7 percent. 3 May: erythrocytes—$5.8x10^{12}$/liter, leukocytes— $4.0x10^9$/liter, neutrophils—74 percent, eosinophils—1 percent, basophils—1 percent, lymphocytes—11 percent ($0.440x10^9$/liter), monocytes—13 percent, thrombocytes— $180x10^9$/liter. The quantity of myelokaryocytes determined by sternal puncture on 8 May was $77.5x10^9$/liter, however a significant fraction of them were lysed, or they exhibited signs of destruction; 6 May—up to $2.3x10^9$/liter, 22 May—$2.1x10^9$/liter, thrombocytes were $80x10^9$/liter on 17 May, and $27x10^9$/liter on 22 May. Diagnosis: third degree acute radiation sickness. Bone marrow karyocytes— $4.4x10^9$/liter, approximately 50 percent represented by damaged forms. Megakaryocytes were not determined. Bone marrow transplant was indicated for the patient in connection with pronounced leukopenia, thrombocytopenia and aplasia of hemopoietic tissue. There were no contraindications to bone marrow transplant. At 2000 on 22 May donated bone marrow was introduced into bone tissue under local anesthesia produced by 2 percent novocaine solution. Blood group A (II) positive, compatible with respect to HLA and the ABO and P system, in an amount of 200 ml, $8x10^9$ myelokaryocytes.

Maintained in an aseptic isolation ward from 22 May to 27 May in connection with agranulocytosis. Blood indicators normalized. On 26 May the quantity of thrombocytes increased to $140x10^9$/liter, and leukocytes increased to $4.5x10^9$/liter. Complained of headache, weakness, irritability. Treatment: essentiale, folic acid injections, lithium carbonate, multiple vitamins, sea buckthorn oil. The patient's condition improved: Weakness and headaches decreased. Superficial gastroduodenitis was established on 13 June. The blood leukocyte count was subsequently observed to decrease and increase in waves, with decreases down to $1x10^9$/liter. Blood cellular composition indicators stabilized in mid-July—that is, more than a month and a half after exposure. Periods of leukopenia coincided with disappearance of large granule-containing lymphocytes in peripheral blood.

Prior to release, myelokaryocytes were $52,250x10^9$/liter; damaged elements were around 5 percent. Released in satisfactory condition on 11 August. Data from the radiological history, the primary reaction and clinical and hematological indicators led to a diagnosis of third degree acute radiation sickness, superficial gastroduodenitis and a pronounced asthenic syndrome.

Development of Microbiological Industry and Problems of Safeguarding Public Health

927C0194A Bishkek ZDRAVOOKHRANENIYE KYRGYZSTANA in Russian No 4, Jul-Aug 91 pp 3-5

[Article by Yu.P. Popov, Kirghiz Scientific Research Institute of Ecology and Prevention of Infectious Diseases]

[Text] Intensive development of microbiological industry and bioengineering, which are based on microbiological synthesis of different species of microorganisms (yeasts and mold fungi, actinomycetes, bacteria etc.), has brought a qualitatively new form of environmental pollution into being—the biological factor.

Besides antibiotics, microbiological industry produces vitamins, enzymes, amino acids, microbiological plant protection resources, nutrient protein, bacterial fertilizers and a number of other products of important significance to agricultural production, medicine and some other industrial sectors. However, its intensive development brought into being an entirely new problem that had never been encountered before, one brought about by the advent of the microbial factor in pollution of the workplace and the environment.

It should be noted that although antibiotic production is one of the sectors of industry that formed earliest, the influence of releases of antibiotic-producing microbes and the products of antibiotic synthesis on the health of different population groups has not been studied adequately.

A certain amount of facts have been accumulated on the toxic action of a number of antibiotics upon the bodies of workers and experimental animals: nephrotoxic (A. A. Firsov et al., 1980; Sack et al., 1978; Szabo et al., 1980), negative effects on the activity of some enzymes (Dhami et al., 1979), cholesterol metabolism (G. A. Mikhaylets et al., 1979), hepatic protein-nitrogen metabolism (Ye. D. Goldberg et al., 1977; R. V. Baru et al., 1975; D. Ya. Poberezkina et al., 1978; G. B. Shteynberg et al., 1977), reduction of blood serum lysozyme activity (D. F. Pletsitiy et al., 1971; D. Ya. Poberezkina et al., 1978; L. I. Izraylet et al., 1974; M. E. Baumane, 1975).

Many antibiotic producers and the antibiotics themselves have specific action upon the body, manifesting itself as the ability to remain in the body (and possibly multiply within it), the ability to form a toxin, and the ability to alter the intestinal microbial community and the autoflora of the skin and mucous membranes. This was demonstrated not only in relation to producers of medical antibiotics but also antibiotics used in feed, including ones made at the Frunze Antibiotics Plant (Ye. A. Melnikova, 1976; E. A. Akhmatova, 1978; D. M. Kachalay et al., 1978).

The ability of antibiotics to suppress the immunological reactivity of the human body is closely associated with their ability to evoke allergic reactions (L. M. Chaban et al., 1971; L. I. Izraylet et al., 1976).

It should be noted that presently the USSR is the only country in the world producing microbiological protein (dry yeast biomass, referred to as protein-vitamin concentrate, which also goes by the commercial name of "paprin") by an industrial method.

A. A. Kumayeva (1975) established significant incidence of occupational skin diseases among workers having contact with producing microbes or with the finished product. It has also been established that producing microbes and protein-vitamin concentrate evoke upper respiratory and dermal pathology and cause significant change in the immunological reactivity of the body, the capacity to act as a *Candida* carrier, and so on, even in persons working a short time (R. M. Kollo et al., 1974; S. I. Ashbel et al., 1976; K. I. Kalchenko et al., 1977; G. I. Mukhametova et al., 1979).

Research carried out by the Scientific Research Institute of General and Communal Hygiene of the USSR Academy of Medical Sciences established that different forms of nutrient protein have general toxic and sensitizing action upon the body. In the case of inhalation, such sensitization manifests itself earlier and at smaller concentrations than does the general toxic effect (V. I. Nemyrya et al., 1985; Yu. A. Manyashin et al., 1986). As was indicated by V. I. Nemyrya (1989), in contrast to chemicals, biological aerosols can sensitize the body even at very small allergen doses.

Enterprises producing protein-vitamin concentrate (paprin) are the principal sources of biological contamination of the environment. According to data of the Angarsk Scientific Research Institute of Labor Hygiene and Occupational Diseases, dust created by high-volume production of protein-vitamin concentrate can spread 5-8 km, and producing microbes can spread up to 2.5-4 km from the plant (Yu. A. Manyashin et al., 1986). In addition to this, biological contamination of other environmental features is noted: open-air water basins and streams, soil (G. I. Vasilyeva et al., 1986; N. I. Motorova et al., 1986).

For these reasons development of bioengineering creates the real danger of sensitizing the population to biological and chemical environmental contaminants (G. I. Sidorenko et al, 1984; I. A. Ivanova, 1986; Yu. N. Molkov et al., 1988).

It should be noted that the first manifestations of an unfavorable influence from the discharges of a protein-vitamin concentrate plant were noted back in the late 1960s among residents of the city of Kirishi (Leningrad Oblast), expressing themselves as an abrupt increase in incidence of respiratory and dermal diseases and allergic states among children and adults, all of which came to be called "Kirishi disease."

Study of the toxic properties of a large number of amino acids (alanine, phenylalanine, leucine, aspartic acid etc.) at the Riga Medical Institute in the 1970s revealed a relationship between the nature of toxic action and structural features of amino acids and the means of their uptake by the body. Thus when introduced into the stomach of albino mice, L-leucine is the most dangerous, for which the LD-80/LD-16 ratio is equal to 1.55, at the same time that this indicator is 7.8 and 3.8 for L-aspartic acid and L-valine respectively.

The results of experimental research on alanine, aspartic acid, valine and phenylalanine indicate that they lack local irritant action, dermal resorptive action and action upon the mucous membrane of the eyes of albino rats.

Prolonged administration (for 1 year) of L-lysine to albino rats and guinea pigs with food in an amount of 0.9 percent of ration protein did not evoke significant changes either in the balance of nitrogenous compounds and the ratio of protein fractions in blood serum, or in the level of a

number of enzymes (aminotransferase, phosphatase, cholinesterase). At the same time Roszkowski et al. (1974) cite evidence of embryotoxic action of some amino acids.

Because a number of industrially produced amino acids are contained within the substance of the human and animal body, the need arises for assessing the nature of changes in metabolic processes as well as in associated enzyme systems, kidney and liver function, the level of amine nitrogen in blood and the body's nitrogen balance, and for studying the correlation between toxic action and level of amino acids in blood (V. I. Nemyrya et al., 1985).

P. G. Tkachev et al. (1983) points to the great danger of contaminating atmospheric air with nutrient methionine (an amino acid). A maximum permissible concentration of methionine in the atmospheric air of population centers equal to 0.6 mg/m^3 was proposed on the basis of research carried out by the authors cited above.

In 1985 the USSR Ministry of Health approved a list of permissible concentrations for 19 amino acids in workplace air, including for amino acids to be produced, according to plans, at the Frunze plant of the Biofarm Association (threonine—2 mg/m^3, isoleucine—5 mg/m^3, glutamic acid—10 mg/m^3). In 1987 the USSR Ministry of Health approved tentatively safe levels of action (OBUV) of amino acids in atmospheric air of population centers, to include threonine (0.05 mg/m^3) and isoleucine (0.7 mg/m^3). However, maximum permissible concentrations of amino acids have still not been developed for atmospheric air of population centers.

Production of enzymatic preparations based on microbiological synthesis has enjoyed wide development abroad, and in recent years in our country as well, because this method is the most promising and economical (L. M. Chelpokova, 1968; M. Ye. Beker, 1978; V. A. Bykov, 1986 etc.), and the enzymes that are obtained are used successfully in food industry, agriculture and medicine, in pulp production, and in other sectors of the national economy (R. P. Zeltin et al., 1978; R. Yu. Are, 1980).

The enzymatic preparation L-aspartase was observed to cause a decrease in the rate of weight gain, an increase in excitability of the peripheral nervous system, and at relatively large doses, an increase in the concentration of protein in urine and a significant decline in the quantity of glutamine and asparagine in the blood of experimental animals.

A number of enzyme producers (the fungus *Trichothecium roseum*) and the enzyme they produce, cytorosemine PKh, possess a sensitizing property. In this case allergic manifestations (fever, skin rashes, allergic rhinitis), accompanied by elevated leukocytosis, agglomeration of leukocytes, elevated leukergia and other phenomena, were noted in 56 percent of workers employed in this enzyme's production. Similar properties were revealed in *Bacillus subtilis*, a producer of tryptophan (L. V. Portnaya, 1986).

Enzymes obtained by microbiological synthesis such as proteases, amylases and others have an irritant action on the skin and mucous membranes in addition to a sensitizing action (P. L. Zeltser et al., 1980).

Thus the little information provided here indicates that producing microbes and the products of microbiological synthesis (including amino acids) are a qualitatively new form of biological contamination of the environment, having multifaceted negative effects upon the health of people residing within the zone of influence of releases from enterprises of microbiological industry. This fact in turn demands a sensible approach to the problem of locating enterprises of this sort within the limits of population centers, to selecting the procedures for producing the corresponding products, to the procedures for treating atmospheric releases and industrial liquid wastes, and to decontaminating and recycling solid wastes with the purposes of reducing environmental contamination. Protection of the air of population centers from both producing microbes and the products of microbial biological synthesis has priority significance in this case.

National Workshop Seminar on Psychosocial Consultation for HIV Infection

927C0136E Kiev VRACHEBNOYE DELO in Russian
No 6, Jun 91 pp 113-114

[Article by Yu.V. Kobyshcha and T.Yu. Burova, Scientific Research Institute of Epidemiology and Infectious Diseases imeni L.V. Gromashevskiy, and USSR Ministry of Health Central Scientific Research Institute of Epidemiology]

UDC 616.9:001.8

[Text] A national workshop seminar on psychosocial consultation for HIV infection was held in Moscow from 8 to 12 October 1990. The seminar was organized by the WHO European Regional Bureau at the Central Scientific Research Institute of Epidemiology of the USSR Ministry of Health. Executives and associates of all republic and a number of regional and oblast AIDS prevention and control centers took part in its work.

The seminar was opened by statements from Academician V. I. Pokrovskiy, president of the USSR Academy of Medical Sciences, and WHO European Bureau chairman A. I. Gromyko, who noted that WHO has recognized AIDS to be the number one problem. As of 30 June 1990 over 266,000 AIDS patients had been registered in 157 countries of the world, to include over 35,000 in European countries. The number of infected individuals has not been established precisely, because not all countries have introduced their mandatory registration. It is believed that their number is 5-10 million.

Over 500 HIV-infected citizens of the USSR and 41 patients have been recorded in our country. Twenty-four persons have died, including 16 children. The disease was noted in 12 union republics.

Intensive spread of HIV infection has raised alarm both among medical workers and scientists and among many state institutions, inasmuch as numerous economic, social and legal problems have arisen. They pertain not only to patients infected with AIDS, but also to surrounding individuals, who are subjected to the risk of infection or are afraid of catching the disease. In this connection WHO views consultation as an important part of prevention and control of AIDS, and believes it suitable to prepare and train a wide range of physicians in consultation methods, and primarily physicians working on the problem of HIV infection.

Highly qualified specialists from England (R. Miller, L. Curran, D. Murray), Sweden (Ya.-O. Morfeldt) and Ireland (Dzh. Stivens) [transliterations] were invited to the seminar to conduct the workshops. The seminar's training program was organized as a succession of short and very concise lectures and practical work in groups consisting of 7-8 persons. The lectures were given in an atmosphere of active interaction between the lecturer and the audience, which continued into the study groups as well. "Brainstorming," a method of intensive assimilation of an issue, and role-playing in situations encountered in the practical work of a consulting physician were constantly employed in the study groups. The overall objective of the seminar was worded by its organizers as teaching medical specialists the methods of psychosocial consultation in order to permit them to provide assistance and support to persons infected with HIV, AIDS patients, and surrounding individuals.

Different variants of the psychosocial consequences of HIV infection to these categories of the population were examined in the course of the training. Attention was turned to the need for consultants to take a differentiated approach to persons desiring to avoid infection or prevent transmission of HIV to others. Also deserving of attention is study of approaches used in the practice of Western countries toward psychological preparation of persons undergoing testing for the event that they might be tested positive for HIV. Special attention and assistance is devoted to surrounding individuals—family members, relatives, friends and so on. A negative HIV test is not a reason to stop working with a patient. On communicating such a result, the physician should recommend to the patient that he alter his behavior with the purpose of preventing possible infection in the future. When consultation is provided to HIV-infected individuals in the incubation stage, the main attention should be turned to preventing transmission of HIV to other persons, to instructing the patient in a proper way of life, and to the psychological support provided to him by surrounding individuals and the physician.

The seminar's participants were unanimous in the opinion that adequate attention is still not being devoted to this issue locally, and its significance is being understated. The primitive level of public health education and the absence of a sufficient quantity of resources for personal prevention, and of accessible information materials on the AIDS problem, result in the fact that a large number of people in the country have no awareness of AIDS prevention, and they are extremely aggressive in their attitude towards AIDS patients and HIV-infected individuals. It was also noted that far from all physicians enjoy the trust of the patient. The confidentiality of the patient-doctor relationship has often been violated, with HIV test results being revealed to many people.

Effective preventive work is hindered by obsolete legislation, a number of provisions of which require review in connection with the new conditions—for example legislation making homosexuality a criminal offense. Distrustful of official medicine, potential or real virus carriers in risk groups avoid contact with doctors, and become practically unreachable to them for preventive work.

The basic directions of solving the discussed problems in application to the conditions of the USSR were formulated in the seminar with regard for the experience of foreign countries in fighting AIDS. It would be suitable to recommend that republic AIDS prevention and control centers discuss the corresponding issues of psychosocial consultation, introduce this method more widely into the work of anonymous offices and centers, train physicians in the work procedures, and attract the interest of various benevolent funds and public informal associations to this problem so that all possible forms of support could be provided to HIV carriers and AIDS patients.

Human Immunodeficiency Virus Reverse Transcriptase Activation of Tu-Element Transposition Cycle in *Saccharomyces cerevisiae* Yeast

927C0034A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 318 No 3, May 91 pp 739-742

[Article by N.L. Reznik, O.V. Kidgotko, and N.G. Shuppe, General Genetics Institute imeni N.I. Vavilov, USSR Academy of Sciences, Moscow]

UDC 575.113

[Abstract] A model system with a high level of expression of foreign reverse transcriptase was employed to investigate the possibility of transposition induction using other factors, primarily reverse transcriptase, rather than exogenous Tu. Data on the expression of reverse transcriptase in *Saccharomyces cerevisiae* DBY746 showed that there was active synthesis of mRNA by HIV reverse transcriptase in cells transformed by plasmid pAB24/RT. In addition, investigation of the effect of HIV reverse transcriptase expression on Tu-element transposition demonstrated that transposition begins in cells that actively synthesize HIV reverse transcriptase, thus suggesting that heterologous reverse transcriptase induces Tu- element transposition. It was also shown that virus-like particle formation accompanies retrotransposition induction by the exogenous Tu-element. Finally, the results also indicated that there are nucleic acids that correspond to the complete Tu-element in virus-like particle fractions. Tables 1; references 14: 3 Russian, 11 Western.

Xenotransplantation of Embryonal Neocortex Tissue into Mature Animals

927C0050A Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian Vol 100 No 3, Mar 91 pp 16-19

[Article by R.P. Kleshcheva, Chair of Human Anatomy, Donets Medical Institute]

UDC 616.831.31-053.9-089.843-031:611.813-053.13-032:616-092.9

[Abstract] The objective of this investigation was to determine whether xenotransplants of embryonal nerve tissue stimulate reparative processes on an altered, mature neocortex. Neocortex tissue 2x3 mm in size from 12-20 week human embryos was transplanted into 31 mongrel albino rats 2-3 years of age from which a 3x4 mm section of cortex had been removed in the parietal lobe. The results demonstrated that the changes consisted of diffuse and local cellular devastation with localization of the wrinkled hyperchromic neurons in the II and IV cytoarchitectonic layers and deformed and hypochromic neurons in the III, V, and VI cytoarchitectonic layers. This investigation confirmed the initial hypothesis that non-differentiated embryonal nerve tissue stimulates the regeneration of neocortex cells in mature rats. Furthermore, the dynamics of morphofunctional alterations in cerebral nerve tissue also suggest a stimulating effect of the xenotransplant in the recipient brain. In addition, increases in neuron size and the disappearance of ghost cells suggest a standard pattern of visual normalization in the neocortex. These findings suggest that xenotransplants of embryonal neocortex tissue accelerate age-related attenuated compensation-restoration processes in neurons and macroglial elements. Accordingly, the data confirm the working hypothesis of the possibility of affecting irreversibly dystrophied and altered cells in the neocortex of mature animals by xenotransplantation with analogous embryonal tissue. Figures 1; references 13: 7 Russian, 6 Western.

Chemotherapy of Disseminated Malignant Melanoma of Skin Using Combination of Nitrosomethyl Urea, Vincristine, Peplomycin, or Bleomycetin

927C0056A Leningrad VOPROSY ONKOLOGII in Russian Vol 37 No 2, Feb 91 pp 162-167

[Article by V.G. Tanayev and M.A. Gershanovich, Order of the Worker's Red Banner Oncology Scientific Research Institute imeni Professor N.N. Petrov, USSR Ministry of Health, Leningrad]

UDC 616.5-006.81.04-085.277.3

[Abstract] Two original therapeutic programs of combined chemotherapy for disseminated malignant melanoma of the skin were clinically evaluated in 129 patients aged 14-72 years. The control group was administered nitrosomethyl urea and dacarbazine in a 5-day regimen with daily intraperitoneal injections of the preparation in a dose of 250 mg/m^2 consisting of at least two cycles at 3-4 week intervals. Combined chemotherapy was performed in two 6-day cycles and consisted of intraperitoneal injections of nitrosomethyl urea (350 mg/m^2) and vincristine (1.4 mg/m^2) and either peplomycin (intramuscularly, 5 mg per day, days 1-6, or 10 mg per day, days 1, 3, and 5) or bleomycetin (intramuscularly, 10 mg per day, days 1-6) at 3-4 week intervals. The group given nitrosomethyl urea-vincristine-peplomycin had 12 percent total and 38 percent partial remission rates, with an average duration of 5 months. On the other hand, the nitrosomethyl urea-vincristine-bleomycetin group had 8 percent total and 27 percent partial remission rates, with an average duration of 6 months. The results demonstrated that chemotherapy with nitrosomethyl urea-vincristine-peplomycin is statistically more effective than dacarbazine chemotherapy. It is also more effective with respect to metastases in the peripheral lymph nodes, lungs, and other internal organs. Vomiting, hyperthermia, and diarrhea are the most common side effects, and there is no leukocytopenia or thrombocytopenia. In conclusion, these findings suggest that the use of nitrosomethyl urea and vincristine combined with the tumor-fighting antibiotic peplomycin is a viable alternative to the less effective treatment of primary disseminated forms and inoperable relapses and metastases. Tables 3; references 7: 3 Russian, 4 Western.

Prospects for Using Liposomes in Medical Practice

927C0136A Kiev VRACHEBNOYE DELO in Russian No 6, Jun 91 pp 16-20

[Article by O.A. Synovets, D.Ye. Lapshin and Yu.V. Rudenko, Odessa City Clinical Hospital No 2, and the Department of Internal Diseases 1 (Director, Prof V.G. Rudenko), Odessa Medical Institute]

UDC 576.3:615.27

[Text] A significant quantity of experimental and clinical research has been devoted in recent years to studying a new method, with promising medical applications, of immobilization and directed transport of medicines in liposomes [13,16,25,42]. Liposomes are vesicles artificially created out of lipid layers separated by an aqueous phase. Depending on the number of layers, we distinguish between monolaminar (double-layer) and multilaminar (multiple-layer) liposomes, in each of which the double layer is separated by an aqueous phase.

The known property of lipids for spontaneously swelling to form liquid- crystal structures in the presence of a large quantity of water or in salt solutions lies at the basis of theoretical work on acquisition of liposomes. Practically any compound may be incorporated into a liposome. Water-soluble drugs enter its aqueous internal phase, while lipophilic compounds become incorporated in the double-layer membrane.

The possibility of using liposomes to deliver drugs has been demonstrated in a number of fundamental studies [15,24,28,41,42]. Presence of a lipid membrane protects the drug incorporated into the liposome from premature deactivation in response to blood enzymes and tissue transsudates. In addition liposomes possess the unique

ability of intracellular delivery of drugs, which is possible owing to fusion of the liposome with the cell membrane (in this case its lipid components become incorporated in the membrane), or phagocytic capture of liposomes by cells. In the latter, degradation of the lipid shell begins early, in endovacuoles, prior to its entry into a lysosome [12]. Emergence of the drug encapsulated in liposomes into cellular cytoplasm is thus ensured. This opens up possibilities for raising the effectiveness of a drug and prolonging its therapeutic action while simultaneously reducing its dose.

However, what has paramount significance to directed transport of drugs is their selective accumulation in different organs after a particular means of administration. Following intravenous injection, 50-80 percent of liposomes are absorbed in the course of 20-40 minutes by cells of the uninuclear phagocytic system, and chiefly by kupferovskiye [transliteration; copper-bearing?] cells and hepatocytes in the liver [34,37]. The lipid composition of liposomes, their surface charge and their dimensions play a role in the effectiveness of their capture. Thus, small monolaminar liposomes remain in the bloodstream five to eight times longer than multilaminar or large monolaminar liposomes [16,17,25]. Directed transport of drugs entrapped in liposomes to organs not possessing high phagocytic activity requires solution of at least two problems: 1) keeping the liposomes from being captured by actively phagocytic cells; 2) preserving the integrity of the liposomal membrane, which may be damaged by various plasma components during circulation of the liposomes in the bloodstream [18].

The most promising way to solve the first problem is to cover the liposome surface with proteins for which there are no receptors on the plasma membrane of phagocytic elements. Preliminary saturation of actively phagocytic organs with "empty" liposomes not containing drugs, which keeps the subsequently administered liposome-encapsulated drug from being captured, is another widespread method. The second problem— protecting liposomes from the damaging action of plasma proteins—is solved by introducing cholesterol into the liposome membrane. This increases the integrity of liposomes in the bloodstream by 80-90 percent. Liposomes can also be created out of phospholipids with a gel- liquid crystal transition temperature that is above physiological temperature, which ensures that they remain solid and intact as they circulate [16,24,28,42]. Solution of these problems makes directed transport of liposomes to target tissues possible.

Liposomes may be potentially immobilized by many means: first, by modifying the liposome surface through purposeful selection of organotropic lipids, glycoproteins and lectins [1,3,4,23]. Attachment of immunoglobulins, which may be selected for the most diverse cell receptors, will be of great interest in the future [28,36,48]. Second, by obtaining liposomes capable of releasing the drug they contain depending on change in external conditions (local hyperthermia caused by a pathological process or an external heat source, change in the acid- base equilibrium in zones of inflammation or neoplasms). This is achieved by creating liposomes out of phospholipids possessing a phase transition temperature somewhat above physiological temperature [11], and by introducing pH-sensitive lipids into the liposome membrane [16,28].

It should be noted in connection with the above discussion that specific targeting of liposomes is not an important problem in all cases. For example when injected subcutaneously, liposomes are eliminated from the injection site chiefly by the lymphogenic pathway. In this case maximum accumulation of the drug occurs in regional lymph nodes [20]. In orthopedic practice, particularly when treating arthrosis and arthritis, specific immobilization may be attained by local intra-articular injection [26,39,43,46]. Research is being conducted on inhalational administration of liposomes to treat pulmonary diseases [21].

An example of practical use of liposome-encapsulated drugs would be treatment of patients with Gaucher's disease. Liposome-encapsulated glucocerebrosidase was injected, making it possible for it to penetrate into liver cells and have a positive impact [32,49]. Inclusion of the nucleic acids DNA and RNA in liposomes and their intracellular delivery are important to the treatment of other hereditary diseases [5,9,33,44]. In recent years a significant number of papers have been devoted to a promising direction—use of liposome-encapsulated forms of insulin [6,10,19,29,30,45].

Ternova [26,27] experimentally and clinically studied the possibility of raising the effectiveness of drugs in liposomal form for intra-articular injection. The diagnostic value of liposomal forms of X-ray contrast media, which open up prospects for contrasting the liver and the spleen, was experimentally substantiated and clinically confirmed [2,14,31].

Use of liposomes for directed transport of drugs significantly widens the possibilities of chemotherapy of malignant tumors. When agents such as actinomycin-D, novembichin, bleocimin and others entrapped in liposomes are used, the overall toxic effect of the drugs is reduced and the time of their therapeutic action is prolonged [8,35,38,47,50].

It was demonstrated with an experimental model of tumor metastasis in the mouse liver that when cis-dichloraminoplatinates are included in the composition of liposomes, their anticancer effect is increased. At the same time a decrease is noted in the anticancer action of vinblastine, which is apparently caused by the inability of this drug to diffuse into centers of cancerous implantation out of kupferovskiye cells and hepatocytes, which engulf liposomes intensively [22]. An abrupt decrease in the quantity and volume of metastasis in mice with Louis's carcinoma was experimentally established in response to administration of the immunostimulator GMDP [not further identified] encapsulated in liposomes. A significant increase in the functional activity of alveolar and peritoneal macrophages was also noted [7].

Research on the use of liposomes in experimental and clinical medicine is attracting increasingly larger numbers of researchers with every year. In this survey the authors have attempted to show the promise of this method, which will help us solve an important problem of practical medicine—attaining the longest possible effect with administration of a minimum quantity of a drug.

Bibliography

1. Artemenko, I. P., "Modification of the Lipid Composition of S 1300 P 18 Neuroblastoma Cells by Means of Liposomes," Abstract of a Dissertation in Pursuit of the Academic Degree of Candidate of Biological Sciences, Kiev, 1989, 19 pp.

2. Bekmuratov, Ye., "Study of the Diagnostic Properties of Liposomal Forms of X-Ray Contrast Media and Pathology of the Hepatosplenic System," Abstract of Dissertation in Pursuit of the Academic Degree of Doctor of Medical Sciences, Moscow, 1988, 24 pp.

3. Bekreneva, V. Yu., Loshchakova, L. V. and Krayz, B. O., "Utilization of Heightened Capture of Liposomes From Lipids of Target Cells in Chemotherapy of Experimental Animal Tumors," in "Napravlennyy transport i immobilizatsiya biologicheski aktivnykh preparatov dlya klinicheskoy praktiki" [Directed Transport and Immobilization of Biologically Active Drugs for Clinical Practice], Kiev, 1984, pp 4-5.

4. Bogdanov, A. A., "Modification of the Surface of Liposomes With the Goal of Regulating Their Interaction With Cells," Abstract of Dissertation in Pursuit of the Academic Degree of Candidate of Biological Sciences, Moscow, 1988, 20 pp.

5. Davidenkova, Ye. F., Rozenberg, O. A., Noskin, L. A. et al., "Introduction of Enzymes and Nucleic Acids Into Pro- and Eukaryotic Cells by Means of Liposomes," in "Materialy Vsesoyuz. simpoz. 'Liposomy': Vzaimodeystviye s kletkami i tkanyami" [Proceedings of the All-Union Symposium "Liposomes": Interaction With Cells and Tissues], Moscow, 1981, pp 130-139.

6. Stefanov, A. V., Kononenko, I. N., Lishko, V. K. and Shevchenko, A. V., "Effect of Insulin in Liposomes Administered per os on the Blood Sugar Level in Rats Under Normal Conditions and in the Presence of Experimental Diabetes," UKR. BIOKHIM. ZHURN., Vol 52, No 4, 1980, pp 497-500.

7. Umanskiy, V. Yu., Stefanov, A. V., Bondar, O. P. et al., "Effect of GMDP Entrapped in Liposomes on Metastasis of Louis's Pulmonary Carcinoma," EKSPERIM. ONKOLOGIYA, Vol 10, No 5, 1988, pp 40-43.

8. Gruntenko, Ye. V., Nikolin, V. P. and Matiyenko, A. N., "Liposomes as Carriers of Antitumor Chemical Preparations and Neoplastic Afflictions of the Liver," DOKL. AN SSSR, Vol 265, No 1, 1982, pp 225- 228.

9. Davidenkova, Ye. F., Shvarts, Ye. I. and Rozenberg, O. A., "Protection of Biopolymers by Artificial and Natural Membranes in the Problem of Treating Hereditary Diseases," VESTN. AMN SSSR, No 8, 1978, pp 77-83.

10. Dolginova, Ye. A., "Biological Activity and Aggregational Stability of Liposomes Containing Insulin," Abstract of Dissertation in Pursuit of the Academic Degree of Candidate of Biological Sciences, Moscow, 1989, 19 pp.

11. Davidenkova, Ye. F., Ternovoy, N. K., Rozenberg, O. A. et al., "Dependence of Prolongation of the Anti-Inflammatory Activity of Hydrocortisone in Liposomes on Their Lipid Composition in the Presence of Experimental Arthritis," BYUL. EKSPERIM. BIOLOGII I MEDITSINY, No 6, 1984, pp 656-658.

12. Ivanov, N. N., "Investigation of the Stability of Liposomes in Model and Biological Systems by Physicochemical Methods," Abstract of Dissertation in Pursuit of the Academic Degree of Candidate of Biological Sciences, Moscow, 1987, 20 pp.

13. Antonov, V. F., Knyazev, Yu. A., Moshkovskiy, Yu. Sh. et al., "Use of Liposomal Forms of Drugs in Clinical Medicine," SOV. MEDITSINA, No 5, 1983, pp 59-63.

14. Zherbin, Ye. A., Aliyakparov, M. T., Davidenkova, Ye. F. et al., "Liposomes With Verografin [transliteration]—A New Hepatosplenitropic Form of Water-Soluble X-Ray Contrast Medium," in "Tr. I Resp. syezda onkologov, rentgeno-radiologov Kazakhstana" [Transactions of the First Republic Congress of Oncologists and X-Ray Radiologists of Kazakhstan], Alma-Ata, 1981, pp 325-326.

15. Vlasov, G. S., Salov, V. F., Torchilin, V. P. and Berdichevskiy, V. R., "Liposomes and the Prospects of Their Use in Applied Immunology," ZHURN. MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOLOGII, No 8, 1982, pp 12-19.

16. Gregoriadis, G. and Allisona, A. (Editors), "Liposomy v biologicheskikh sistemakh" [Liposomes in Biological Systems], Moscow, Meditsina, 1983, 384 pp.

17. Korovkin, B. F., Gosudarskiy, V. I., Novikov, N. I. et al., "Liposomes and Their Use in Medicine," VOYEN.-MED. ZHURN., No 4, 1983, pp 38-41.

18. Los, G. V., "Effect of Human Blood Components on the Stability of Liposomes," Abstract of Dissertation in Pursuit of the Academic Degree of Candidate of Biological Sciences, Kiev, 1987, 19 pp.

19. Moshkovskiy, Yu. Sh. and Rossels, A. N., "Prospects of Obtaining a Peroral Liposomal Form of Insulin," in "Napravlennyy transport i immobilizatsiya biologicheski aktivnykh preparatov dlya klinicheskoy praktiki" [Directed Transport and Immobilization of Biologically Active Preparations for Clinical Practice], Kiev, 1984, pp 19-20.

20. Shrayer, G. I., Kreynes, V. M., Golubchikova, N. A. et al., "Use of Liposome Suspensions Against an Experimental Local Purulent Process," KHIRURGIYA, No 4, 1988, pp 30-34.

21. Braginskiy, S. A., Zubarenko, A. V., Lishko, V. K. et al., "Use of Liposomes to Correct Respiratory Hypoxia in

the Presence of Experimental Pneumonia," BYUL. EKSPERIM. BIOLOGII I MEDITSINY, No 10, 1988, pp 421- 423.

22. Kaledin, V. I., Popova, N. A., Nikolin, V. P. et al., "Reduction of the Antimetastatic Effect of Vinblastine When Used in Liposomes," EKSPERIM. ONKOLOGIYA, Vol 10, No 5, 1988, pp 43-46.

23. Rozenberg, O. A., Bekreneva, V. Yu., Loshakova, L. V. et al., "Specificity of Liposome Capture From Lipids of Target Cells," BYUL. EKSPERIM. BIOLOGII I MEDITSINY, No 6, 1984, pp 670-672.

24. Stefanov, A. V., "Use of Liposomes in Medicine," in "Molekulyarnaya biologiya (resp. mezhved. sb.): Struktura i funktsii biopolimerov" [Molecular Biology (Republic Interdepartmental Collection): Structure and Function of Biopolymers], Kiev, Nauk. dumka, Issue 27, 1980, pp 32-44.

25. Stefanov, A. V., "Biochemical Principles of Using Liposomes as Carriers of Biologically Active Substances," Abstract of Dissertation in Pursuit of the Academic Degree of Doctor of Biological Sciences, Kiev, 1987, 26 pp.

26. Ternovoy, N. K., "New Approaches to Intra-Articular Therapy," Abstract of Dissertation in Pursuit of the Academic Degree of Doctor of Medical Sciences, Kiev, 1986, 25 pp.

27. Ternovoy, N. K., Lomnitskiy, O. Ya. and Mants, A. A., "Free and Liposome-Immobilized Proteolysis Inhibitors in the Treatment of Arthritis and Arthrosis," in "Primeneniye fermentov v meditsine (Simferopol, 15-16 apr. 1987 g.): Tez. dokl. resp. nauch. konf." [Use of Enzymes in Medicine (Simferopol, 15-16 April 1987): Abstracts of Reports of a Republic Scientific Conference], Simferopol, 1987, p 19.

28. Trochilin, V. P., Smirnov, V. N. and Chazov, Ye. I., "Problems and Prospects of Using Liposomes for Directed Transport of Medicines," VOPR. MED. KHIMII, Vol 28, No 1, 1982, pp 3-14.

29. Khovaka, V. V., "Study of the Sugar-Reducing Action of Insulin Contained in Liposomes With Peroral Administration to Experimental Animals," Abstract of Dissertation in Pursuit of the Academic Degree of Candidate of Medical Sciences, Kiev, 1988, 19 pp.

30. Shevchenko, A. V. and Khovaka, V. V., "Absorption of Insulin Contained in Liposomes From the Gastrointestinal Tract," in "Napravlennyy transport i immobilizatsiya biologicheski aktivnykh preparatov dlya klinicheskoy praktiki," Kiev, 1984, p 31.

31. Aliyakparov, M. T., Rozenberg, O. A., Fomina, E. V. et al., "Experimental Hepatosplenography After Administration of Liposomes Containing Verografin," MED. RADIOLOGIYA, No 11, 1981, pp 45-47.

32. Braidman, I. P. and Gregoriadis, G., "Rapid Purification of Placental Glucocerebroside: B-Glucosidase and Its Entrapment in Liposomes," J. BIOCHEM., 1977, pp 439-445.

33. Dimitriadis, G. J., "Entrapment of RNA in Liposomes," FEBS LETT., Vol 86, No 2, 1978, pp 289-294.

34. Gregoriadis, G. and Ryman, B. E., "Fate of Protein-Containing Liposomes Injected Into Rats: An Approach to the Treatment of Storage Diseases," ENR. J. BIOCHEM., Vol 24, No 3, 1972, pp 485-491.

35. Gregoriadis, G., "Liposomes: Research Applications Grow," SCIENCE, Vol 199, No 4333, 1978, pp 1056-1058.

36. Gregoriadis, G., "Use of Monoclonal Antibodies and Liposomes to Improve Drug Delivery," DRUGS, Vol 24, 1982, pp 261-266.

37. Roerdink, F., Reghts, J., van Leeuwen, B. and Scherphof, G., "Intrahepatic Uptake and Processing of Intravenously Injected Small Unilamellar Phospholipid Vesicles in Rats," BIOCHIM. BIOPHYS. ACTA, Vol 770, No 12, 1984, pp 195-202.

38. Rutman, kR. J., Ritter, C. A., Avandhani, N. G. and Hansel, J., "Liposomal Potentiation of the Antitumor Activity of Alkylating Drugs," CANCER TREAT. REVS., Vol 60, No 5, 1976, pp 617-618.

39. Phillips, N. C., Page-Thomas, D. P., Knight, C. G. and Dingle, J. T., "Liposome-Incorporated Corticosteroids. II. Therapeutic Activity in Experimental Arthritis," ANN. RHEUM. DIS., Vol 38, No 6, 1979, pp 553-557.

40. de Silva, M., Hazlemann, B. L., Page-Thomas, D. P. and Wraight, P., "Liposomes in Arthritis: A New Approach," LANCET, 1979, pp 1320-1322.

41. Mezei, M. and Gulasekharm, V., "Liposomes—A Selective Drug Delivery System for the Topical Route of Administration," LIFE SCIENCES, Vol 26, No 18, 1980, pp 1473-1477.

42. Tyrrell, D. A., Heath, T. D., Colley, C. M. and Ryman, B. E., "New Aspects of Liposomes," BIOCHEM. ET BIOPHYS. ACTS., Vol 475, 1976, pp 259-302.

43. Dingle, J. T., Gordon, T. L., Hazlemen, B. L. et al., "Novel Treatment for Joint Inflammation," NATURE, Vol 271, 1978, pp 372-373.

44. Ostro, M. J., Giacomoni, D. and Dray, S., "Incorporation of High Molecular Weight RNA Into Large Artificial Lipid Vesicles," BIOCHEM. AND BIOPHYS. RES. COMMUNS., Vol 76, No 3, 1977, pp 836-842.

45. Patel, H. M. and Ryman, B. E., "Orally Administrated Liposomal Insulin," BIOCHEM. SOC. TRANS., Vol 5, No 3, 1977, pp 1739-1741.

46. Shaw, J. H. and Dingle, J. T., "Liposomes as Steroid Carriers in the Intraarticular Therapy of Rheumatoid Arthritis," in Gregoriadis, G. and Allison, A. C. (Editors), "Liposomes in Biological Systems," New York etc., Wiley J. and Sons, 1980, pp 299-324.

47. Simmons, S. and Kramer, P. A., "Liposomal Entrapment of Fluoxuridine," J. PHARM. SCI., Vol 66, No 7, 1977, pp 985-986.

48. Toonen, P. A. K. M. and Crommelin, D. J. A., "Immunoglobulins as Targeting Agents for Liposome Encapsulated Drugs," PHARMAC. WEEKBLAD. SCIENTIFIC EDITION, Vol 5, 1983, pp 269-280.

49. Belchetz, P. E., Braidman, I. P., Crawley, J. C. W. and Gregoriadis, G., "Treatment of Gaucher's Disease With Liposome-Entrapped Glucocerebroside B-Glucosidase," LANCET, No 1, 1977, pp 116-117.

50. Papahadjopoulos, D., Poste, G., Vail, W. J. and Biedler, J. L., "Use of Lipid Vesicles as a Carrier to Introduce Actinomycin-D Into Resistant Tumor Cells," CANCER RES., Vol 32, No 9, 1976, pp 2988-2994.

Tactics and Emergency Aid for Acute Chemical Poisonings

927C0136B Kiev VRACHEBNOYE DELO in Russian No 6, Jun 91 pp 91-94

[Article by V.A. Trotsevich and Docent O.V. Kurashov, Kiev City Emergency Clinical Hospital]

UDC 613.63-099-083.98

[Text] A specialized center for treating acute chemical poisoning victims was organized in Kiev in October 1986. It contains 30 beds for acute poisoning victims, six beds for intensive therapy, an extracorporal detoxification department, and a toxicological and a biochemical laboratory. The center treated 6,520 acute poisoning victims in 3.5 years. The most frequent poisonings recorded were by sedative and psychotropic drugs, alcohol and its surrogates, mushrooms, organophosphoric compounds, chlorinated hydrocarbons, caustic materials and so on. Successful treatment of acute victims of exogenic toxins depends in many ways on the promptness of emergency measures, which include symptomatic and syndromal therapy in addition to specific antidotes.

The material that is believed to have caused the intoxication, or the biological medium in which it may be contained, is labled, sealed and stored in a safe for diagnostic purposes and to prevent the poisoning of others. Prior to making a diagnosis the victim should be examined unclothed, particularly to reveal trauma and signs of injections.

Emergency treatment of these victims must be based chiefly on clinical examination data. Postponing intensive therapy until laboratory identification of the toxicant is thought to be a mistake. The basic principles of treating acute poisoning victims are identically applicable to children and adults. The purposefulness of first aid and its early provision before reaching the hospital have important significance in acute poisonings to the outcome of exogenic chemical intoxication. Respiratory function, hemodynamics and temperature are determined. Emergency treatment consists of eliminating respiratory insufficiency, cardiovascular weakness and hypothermia, and preventing further adsorption of the poison. During first aid and transportation, victims must be laid on their side with the head end lowered 15°, they are given oxygen, and 40 ml 40 percent glucose solution intravenously. Victims with depressed respiration are subjected to endotracheal intubation by an endotracheal tube equipped with an inflatable balloon when the airway is inadequate or when the coughing reflex is greatly suppressed. Every victim in a state of stupor or a coma suspected of a drug overdose is fitted with an intubation tube with an inflatable balloon, and equipment is prepared for intravenous infusion. nasotracheal intubation is preferred because it creates better conditions for oral insertion of a gastric probe. When intubation is difficult, a large-calibre needle is inserted between the thyroid and cricoid cartilages for the time it takes to prepare for a tracheostomy.

If hemodynamics do not normalize after the indicated measures, crystalloid solutions are infused intravenously while monitoring diuresis and hemodynamic indicators. When infusion therapy is inadequate, intravenous drip infusion of vasopressors (dopamine is best) is carried out while monitoring arterial pressure. The first crystalloid solution to be used is 0.9 percent sodium chloride solution. If arterial pressure fails to normalize, 200 mg dopamine are added to 400.0-500.0 ml of the indicated solution. The mixture is infused at a rate of 10-20 drops per minute. In the event of pronounced arterial hypotension, simultaneous intravenous injection of polyglucin and corticosteroids is recommended.

A diagnosis associated with coma caused by drug overdose is based chiefly on clinical examination data. Special attention is turned to chronic illnesses, to drugs used by the victim, and to his habituation and sensitivity to them. Blood samples, the first portions of urine and stomach contents must be subjected to toxicological analysis. A diagnosis can be confirmed by quick toxicant identification methods in biological media, followed by use of specific antidotes.

Stomach contents are evacuated by inducing vomiting or by gastric lavage through a probe. Vomiting is elicited only in conscious victims with intact swallowing reflexes while lying on the left side. The quantity of fluid received in each washing cycle must not exceed 50 ml/10 kg body weight. If the material is very toxic, gastric lavage through a probe must be repeated several times.

Contraindications to reflexive or medicinal stimulation of vomiting include coma, convulsions, loss of the vomiting reflex, and poisoning by gasoline, kerosene, alkalis and acids. Gastric lavage is generally not recommended after alkali poisonings; instead, the victims drink milk and are provided blood plasma. When poisoning occurs by strong inorganic acids, gastric lavage is followed by administration of cold water that is subsequently evacuated.

The respiratory tract must be protected prior to gastric lavage. The victim is laid on his left side with the head end lowered before the probe is introduced into the stomach. A victim in a deep coma must be intubated, and the balloon on the intubation tube must be inflated. A large-sized gastric lavage probe is introduced through the mouth. Then the stomach contents are aspirated, and a portion is

taken for toxicological analysis. As a rule gastric lavage is performed with warm water; in the case of small children, use warm isotonic sodium chloride solution at a quantity of 15 ml/kg, but not more than 200 ml in each washing cycle. In adults, 300 ml of warm (38°) water is used in each washing cycle, with 200 ml being used in the first. The procedure is continued until the wash water comes out clean. The stomach is palpated through the anterior abdominal wall, and its contents are aspirated after each cycle. The volume of the contents must not be less than the quantity of liquid introduced into the stomach. A suspension of activated charcoal or SKN [not further identified] charcoal is administered after gastric lavage. This mixture is prepared by pouring 400 ml of water (distilled would be best) into a glass flask, and then adding 50 gm of one of the indicated charcoals. Victims ingest the mixture at a quantity of 5 ml/kg body weight. A laxative is administered after this: sodium sulfate at a quantity of 250 mg/kg body weight, but not more than 30 gm. When poisoning occurs by fat-soluble toxicants (dichloroethane, organophosphoric compounds etc.), petroleum jelly at a quantity of 1-2 ml/kg body weight is recommended as a laxative. The laxative may be readministered 4-6 hours after the appearance of a charcoal-stained stool. Laxatives are contraindicated in peroral poisonings by caustic liquids, and in the presence of intestinal blockage.

Elimination of many toxicants from the body can be increased by employing forced diuresis at the beginning of treatment, followed by hemodialysis and (or) hemosorption as indicated. Forced diuresis is effective when the material is eliminated with urine unchanged, if it spreads extracellularly, and if it binds with proteins to a minimum extent. In cases of shock, cardiovascular decompensation, pulmonary edema and kidney function disorders, forced diuresis is not indicated. If it is known that the toxic material is not excreted by the kidneys in its active form, then diuresis is not performed in a hospital. The toxicant is subjected to subsequent quantitative determination in blood, stomach contents and urine in order to refine the clinical diagnosis and to permit other treatment methods, as well as for possible forensic medical analysis. In addition to this, examination of the victim includes analyzing blood and urine, taking an EKG, radiological monitoring, and other necessary methods. Blood is analyzed for concentrations of electrolytes, glucose, ketone bodies, bilirubin transaminase, urea and creatinine, and the acid-base balance is determined.

Intact ciliospinal (pupillary) reflexes and symmetry of motor impairment are typical of toxic metabolic coma, and not of primary brain damage. A coma of unknown cause in a previously healthy individual, especially with sudden onset, is often the result of drug poisoning, subarachnoidal hemorrhaging, cerebrocranial injury, and in odler people, hemorrhaging into the brain stem or its infarction. The possibility of acute meningitis should be suspected in every victim in a state of stupor or a coma showing signs of a fever, and spinal fluid should be analyzed. If the victim had complained earlier of headaches (except in the occipital region) or suffered cerebrocranial injury, supratentorial volemic injury may be suspected.

Forced alkaline diuresis is employed at the specialized acute poisoning victim treatment center in cases of poisoning by acetylsalicylic acid, phenobarbital, isoniazid, barbital-sodium and acetic acid. This is done by administering sodium hydrocarbonate solution until a urine pH not lower than 7.5 is attained, as determined by the litmus test. The recommended alkaline diuresis procedure may be carried out even when it is impossible to constantly monitor the electrolyte level in blood plasma. For this purpose an adult victim is given successive intravenous infusions of 500 ml 0.9 percent sodium chloride solution, 500 ml 5 percent glucose solution and 500 ml 1.26 percent sodium hydrocarbonate solution. Beginning with the sixth bottle, 1 gm potassium chloride is added to 500 ml of each solution. During the first 3 hours the indicated solutions are administered successively at a rate of 2 liters/hr, and 0.5 liters/hr after that. The total volume is around 10 liters/day. Diuresis is strictly monitored, blood pressure is measured and the lungs are auscultated. If the positive water balance exceeds 1 liter, diuretics are prescribed—lasix at 1 mg/kg and (or) mannitol at 0.25-0.5 gm/kg. The general therapeutic measures include prevention of hypothermia, aspiration and aqueous intoxication. All acute poisoning victims over 12 years old are seen by a psychiatrist.

The tactics and emergency medical aid we employ in relation to acute poisoning victims in many ways determine a favorable outcome of illness. In this case there is frequently no need to subsequently employ complex, expensive methods of extracorporal detoxification, which are not harmless to the victim and which are not always effective. Hemosorption and hemodialysis are prescribed on the basis of strict indication to those victims requiring accelerated elimination of the toxicant from the body. Such procedures are unsuitable in relation to mild and moderately severe poisonings.

Pathogenesis and Therapy of Persistent Infections Proceeding Together With Immunodeficiency Syndromes

927C0171A Moscow KLINICHESKAYA MEDITSINA in Russian Vol 69 No 5, May 91 pp 29-36

[Article by V.I. Votyakov and A.G. Kolomiyets, Belorussian Scientific Research Institute of Epidemiology and Microbiology, Belorussian SSR Ministry of Health]

UDC 616.9:576.858.13]-08

[Text] As we know, there exist around 500 different viruses capable of afflicting the human body and evoking acute and persistent forms of infection, with the latter able to proceed in latent, chronic and slow forms [4,22]. We also know that development of a significant fraction of viral infections is accompanied by transitory depression of the immune system, expressed to varying degrees and brought about primarily by toxic action or by weakening of the organism. At the same time there are a group of viruses capable of directly afflicting cells of the immune system, and reproducing and persisting in them for a long period of time.

causing the death of these cells or reduction of their functional activity, as is manifested by development of unique forms of immunodeficiency [7]. Diseases evoked by herpes simplex virus (HSV) and human immunodeficiency virus (HIV) have occupied a special position among such infections in the last decade. The persistent attention being shown by virologists involved in the development of chemical antiviral preparations and by clinical specialists toward precisely these nosological forms is brought about by the pandemic nature of their occurrence, by the features of their pathogenesis having to do primarily with development of pronounced immunodeficiency, and by the severity of the course of herpes and AIDS.

Officinal Chemical Antiviral Drugs for the Treatment of Viral Immunodeficiency States

Chemotherapy of viral infections, which formed as an independent science less than three decades ago, has enjoyed significant progress thus far. It was made possible to a significant degree by intensive research on the properties of viruses and on the laws of their reproduction in cells, and by development and clinical introduction of the methods and resources of early diagnosis of viral infections.

While in 1962 only two antiviral drugs were available for clinical use—methisazone and iododeoxyuridine, their number reached 25 in 1990. In this case 17 of them are intended for the treatment of clinical manifestations of HSV and HIV infection (Table 1). A number of promising chemical antiviral drugs for the treatment of HIV infection—ones such as avarol, D-penicillamine, AL-721, analogues of amphotericin B, dideoxycytidine, dideoxyadenosine, rifabutin (ansamitsin), peptide T and dextran sulfate, are in the stage of preclinical and clinical testing on limited contingents of patients [13,26]. It is evident from these data that most officinal chemical antiviral drugs are directed against representatives the families of herpesvirus and retrovirus families. In the last decade these two families of viruses have been the most active "growth points" in the chemical treatment of viral infections in general, and in virus-induced immunodeficiency in particular.

Table 1. Characteristics of Official Chemical Antiviral Drugs Used to Treat Different Clinical Manifestations of HSV and HIV Infections

Drug Name	Illnesses Against Which Drug Is Recommended	Effectively Inhibited Viruses	Means of Administration and Dose
Kerecid (IDU, ophthan-IDU, dendrid, stoxil, herpleks)	OH	Herpesviruses	Instillation of 0.1 % solution into the eye every 1-2 hours
Trifluorothymidine (TFT)		HSV	Application of ointment 4-6 times a day for 5-7 days
Florenal*	OH, K-HZ, K-AdV	Herpesviruses HSV, adenoviruses	Packing 0.25 % or 0.5 % ointment behind eyelid 3 times a day for 10-14 days
Oksolin*, Tebrofen*	OH, HD, HG, HZ, I, VR, K-AdV, K- HZ	Herpesviruses HSV HZV, adenoviruses, orthomyxoviruses influenza A viruses, rhinoviruses	Application of 1 % or 2 % ointment on affected skin areas 2-3 times a day for 5-10 days, instillation into the eye—0.2 % solution (freshly prepared) 5-6 times a day, packing 0.25 % ointment behind the eyelid overnight for 5-10 days, in presence of rhinitis, applying 0.25 % or 0.5 % ointment to nasal mucosa 2-3 times a day for 3-4 days, or dropping 0.25 % solution into nose at two drops into each nostril 3-4 times a day for 3-5 days
Tromantadine	HD, HS, HG, HE	Herpesviruses HSV	Application of 1 % ointment on affected skin areas 3 times a day for 7-10 days
Khelepin*			1-3 tablets per day for 10-15 days, locally as 1 % and 5 % ointment
Bonafton*	HD, OH, HG, GHI, HS	Herpesviruses HSV, HZV	Application of ointment 4-6 times a day for 7-10 days, 0.1 gm tablets 3-4 times a day for 7-10 days
Alpizarin*	HD, OH, HG, GHI, HS, HI CNS	"	Application of 2 % ointment on mucous membranes 4-6 times a day for 5-10 days, 5 % ointment on skin 4-6 times a day for 5-10 days, 1-3 tablets 3-4 times a day for 7-10 days (in severe cases—combined use of medicinal forms produces the best impact)
Cytosar (ara-C, cytarabine)	HE, GHI	"	1-5 mg/kg or 35-50 mg/m^2 once a day intravenously (slow stream) 4-6 times a day
Vidarabine (ara-A, adenine arabinoside)	OH, GI, HZ, GHZ, HE, C	Herpesviruses HSV, cytomegalovirus, varicella-zoster virus	Application of ointment every 2 hours, 10-20 mg/kg a day, intramuscularly every 12 hours for 7-12 days
Bromovinyldeoxyuridine (BVDU)	OH, HG	Herpesviruses HSV, HZV	7.5-15 mg/kg intravenously 3 times a day for 5-10 days

Table 1. Characteristics of Official Chemical Antiviral Drugs Used to Treat Different Clinical Manifestations of HSV and HIV Infections (Continued)

Drug Name	Illnesses Against Which Drug Is Recommended	Effectively Inhibited Viruses	Means of Administration and Dose
Acyclovir** (zovirax, viroleks)	HD, GHI, GI, HE, OH, HG, HS, HZ, HZE, I, CMVE, EEBV, HIV-I, AIDS	Herpesviruses: types I and II HSV, HZV, Epstein-Barr virus, cytomegalovirus, type 6 herpesvirus; retroviruses: HIV-1	Application of creme, ointment 4-6 times a day for 7-10 days. 0.1 gm tablets 1-4 times a day for 7-10 days. Intravenously at 5-30 mg/kg for 1 hours 3 times a day for 7-12 days
Ganciclovir (BIOLF-62, cymevene, cytovene)	CMVE, CMVR, CMVP, EBV- I	Herpesviruses: cytomegalovirus, Epstein-Barr virus, type 6 herpesvirus	3-15 mg/kg intravenously 3 times a day for 10-15 days
Ribavirin (virazole)	HG, OH, GHI, HI CNS, HZE, HF, RSI, HIV- I	Broad spectrum of RNA- and DNA-containing viruses: herpesviruses (HSV, HZV), orthomyxoviruses (influenza A and B virus), hepatitis A virus; retroviruses: HIV-1	Perorally in 200 mg capsules 3-4 times a day (600-800 mg); children—10 mg/kg per day in 3-4 doses for 10-14 days in the presence of hepatitis A, for 5-7 days in the presence of ARVI, 7- 10 days in the presence of herpesvirus infections, 5-7 days in the presence of pediatric viral infections (measles etc.)
Foscarnet (phosphonoformate)	HD, HG, HS, CMVI, HIV- I	Herpesviruses: types I and II HSV, type 6 herpesvirus, cytomegalovirus; retroviruses: HIV-1	Intravenously 60 mg/kg for 2 hours 3 times a day for 10-14 days. Application of ointment on affected areas of the skin and mucous membranes
Azidothymidine (AZT, zidovudine, retrovir)	HIV-I, AIDS	Retroviruses: HIV-1	Perorally 2 capsules (100 mg each) 6 times a day

Note: Here and in Table 3: *—produced in the USSR, **—Soviet analog undergoing clinical study. I—influenza, NS—natural smallpox, EV—eczema vaccinatum, K-HZ—keratitis evoked by herpes zoster virus, HZE—encephalitis evoked by herpes zoster virus, GHZ—generalized herpes zoster, K-AdV—keratitis evoked by adenovirus, VR—viral rhinitis, C—chickenpox, OH—ophthalmic herpes, HD—dermal herpes, HG—genital herpes, HZ—herpes zoster, HS—herpetic stomatitis, GHI—generalized herpetic infection, HI CNS—herpetic infection of the central nervous system, HE—herpetic encephalitis, GI—infant herpes, CMVR—cytomegaloviral retinitis, CMVP—cytomegaloviral pneumonia, EEBV—encephalitis evoked by Epstein-Barr virus, EBV-I—infection evoked by Epstein-Barr virus, ARVI—acute respiratory viral infection, RSI—respiratory-syncytial infection, HF—hemorrhagic fever, HIV-I—infection evoked by human immunodeficiency virus, AIDS—acquired immunodeficiency syndrome, HZV—herpes zoster virus

Intensive enquiry led to the creation of a new generation of antiviral drugs that are highly effective against HSV, HIV and cytomegalovirus (acyclovir, azidothymidine, ganciclovir) and capable of selectively suppressing reproduction of viruses in the infected cell. However, as the experience of clinical use of these drugs showed, despite their high inhibitory activity and their ability to curtail acute manifestations of disease, the problem of treating persistent viral infections accompanied by affliction of the immune system continues to be urgent. It requires an integrated approach—consideration of both the etiological factor and the pathogenetic features of these unique and severe afflictions, characterized by disease of the entire body, and not just one of its organs or systems.

Features of the Pathogenesis of Some Persistent Viral Infections Proceeding Together With Immunodeficiency Syndromes

In the presence of persistent viral infections, viral replication in infected cells, including in cells of the immune system, and the pathological action they have on cells do not always lead to the death of the latter, as is observed in the presence of acute infections evoked by many DNA- and RNA-containing viruses. In a number of cases, for example in the presence of an acute course of persistent infection evoked by HSV or HIV, rapid death of afflicted cells is also observed as a result of release of many virus particles accumulated in these cells, accompanied by clinical manifestations of disease. In other cases incomplete synthesis of virus particles (an abortive, nonproductive infection course) or gradual release of mature virions from them, not leading to rapid cell death, is possible in individual cells. In such cases the cytopathic action of the virus on cells takes the form of certain structural and functional changes, development of degenerative processes that last a long time without clinical manifestation of disease, and its manifestation in atypical form or in periodic recurrence of clinical manifestations of disease. Such interaction of the virus with the cell is noted in the presence of chronic and slow forms of infection. However, the reproductive cycle of the virus in infected cells consists of a number of basically identical stages in the presence of both acute and persistent forms of infection. These stages are convenient targets for antiviral drugs, and they may be blocked or disturbed by them.

One distinguishing feature of persistent viral infections that act as a significant obstacle to antiviral chemotherapy is presence of a latent form, in which the virus does not reproduce in the cell, but its genetic material, which is incorporated into the cell chromosomes, and in a number of cases possibly not even integrated with cellular DNA, not only survives for a long period of time but is also transmitted to daughter cells. In this connection treatment of latent viral infections requires development of methods

of gene therapy based on the ability to distinguish and selectively destroy viral genetic material in the cell genome. Under certain conditions a latent virus reactivates, and the virus begins reproducing in infected cells, making it vulnerable to chemical antiviral drugs.

Suppression of factors responsible for specific and nonspecific immunological reactivity of the organism is an important link in the pathogenesis of persistent viral infections. The possibility that viral infections suppress immunity was proposed for the first time by W. Osler at the beginning of the century—in 1905 [25]. Subsequent study of the features of development of immunodeficient states in the presence of viral infections by means of the methods of molecular immunology made it possible to reveal and describe four basic mechanisms responsible for immunosuppression (suppression of immunity).

The first mechanism is the result of the direct action of complete or aborted reproduction of the virus upon the structural and (or) functional integrity of the lymphocyte. Owing to this influence of the virus, complete destruction (lysis) of the lymphocyte, reduction of its functional activity or its total loss may occur. Such action may be exerted on all types of lymphocytes (for example by measles virus and cytomegalovirus), or only on certain subpopulations of lymphocytes (for example in the case of AIDS, HIV infection etc.). Thus, measles virus has direct action upon T- and B-lymphocytes and K-cells; type I human T- lymphotropic virus (HTLV-I) directly affects T- and B-lymphocytes; types I and II HIV (HIV-I, HIV-II) directly affect T-lymphocytes and macrophages; cytomegalovirus (CMV) directly affects T- and B- lymphocytes, K-cells and macrophages; Epstein-Barr virus (EBV) directly affects T- and B-lymphocytes; HSV directly affects T- and B-lymphocytes and macrophages.

A large number of human herpesviruses have an immunosuppressive action; however, it is not associated with direct lysis of lymphocytes. It has now been demonstrated that in vitro, HSV can both suppress some stages of the immune response in the organism [21] and inhibit mitogen- and antigen-induced blastogenesis [24]. The mechanism of this immunosuppression has not been established precisely. All that is well known is that HSV, which does not reproduce in inactive lymphocytes, can proliferate in all subpopulations of T-lymphocytes if they are activated by some antigen or mitogen [16,17,23]. Clinical observations show that the most severe variants of the development of herpes pathology are noted in persons with immunodeficient states; in such cases we observe double immunodeficiency brought about both by the immunosuppressive action of the HSV itself and by other causes (for example by AIDS, by oncological diseases) [27], obviously owing to synergism of immunosuppressive factors.

The second mechanism is the inhibitory action of soluble factors (of viral or cellular origin), released from infected cells, upon the immune system. The third mechanism is the result of infection and damage of cells responsible for phagocytosis by viruses afflicting macrophages (HSV, HIV, CMV, poliovirus, variola vaccine, dengue etc.). The sensitivity of an infant's macrophages to HSV, which decreases in man with age, can obviously be the cause of higher mortality due to herpes infection in infants and children than in adults.

Finally, the fourth mechanism is the consequence of an imbalance in regulation of the immune system. Such disturbance of normal function of the immune system may be the consequence of development of any of the three immunosuppression mechanisms indicated above.

As was noted earlier, HSV, which can act as the root cause of development of immunodeficiency (Table 2), acquires its greatest significance on the background of primary or secondary immunodeficiency already formed in the patient [27]. As a rule, in such cases HSV causes development of generalized herpetic infection characterized by a severe course and high mortality, irrespective of whether this is a primary infection or one recurring as a result of reactivation of latent virus. It has been noted in this case that the frequency and severity of herpetic afflictions developing as a result of reactivation of the latent form of HSV infection vary significantly depending on the causes of immunosuppression. Thus, Greenberg et al. [15] established in a comparative study of HSV infection in 68 kidney transplant patients and in 30 leukosis patients that despite the practically equal frequency of reactivation of HSV in such patients (46.8 and 50 percent respectively), the frequency of formation of clinically expressed herpetic afflictions was significantly greater in the presence of leukosis (31.8 and 100 percent respectively). The discovered differences are apparently caused by the lower level of antibody-dependent cellular cytotoxicity in leukosis patients.

Table 2. Characteristics of Changes in Basic Indicators of Immune Status in Persons With HSV, CMV and HIV Infections and AIDS

Indicator of Immune Status	Infection Evoked by			AIDS
	HSV	CMV	HIV (prodromal period)	
T4/T8 ratio	D	D	D	DD
Activation of T-suppressors	U	U	UD	U
Activation of cytotoxic T-cells	D	D	UD	D
Delayed hypersensitivity reaction	D	?	D	DD
Blastogenic response to mitogens and antigens (including homologous)	D	?	D	DD
Activation of T-helpers	D	?	D	DDD

Table 2. Characteristics of Changes in Basic Indicators of Immune Status in Persons With HSV, CMV and HIV Infections and AIDS (Continued)

Indicator of Immune Status	Infection Evoked by			AIDS
	HSV	CMV	HIV (prodromal period)	
Activation of natural killers	D	D	UD	D
Activation of granulocytes	D	N	N	N
Production of interferon	D	D	D	D
Production of antibodies	D	N	UU	UU
Production of factor inhibiting migration of macrophages	D	N	?	?
Production of factor inhibiting migration of leukocytes	D	N	?	?
Serum β_2-microglobulin	U	?	U	UU
Immune complexes	U	?	U	UU

Note: Symbols indicate the characteristics (U up, D down, N no change, ? unknown) and intensity of change (D pronounced, DD strongly pronounced, DDD very strongly pronounced) of indicators.

The following is obviously a unique features of HSV infection, and possibly of other infections evoked by representatives of the herpesvirus family in the presence of AIDS. Various factors evoking both disturbance of intracellular mechanisms of cell resistance and weakening of the immune system of the organism as a whole can have an activating effect upon latent HSV. At the same time it should be kept in mind that herpetic infection is itself capable of reactivating latent HIV infection, stimulating expression of HIV in cells, and promoting progression of AIDS. This principle was confirmed both in experimental research conducted in vitro, and in epidemiological observations [4,19,20]. Consequently when these two infections are combined in the patient, they undergo mutual intensification. On one hand HSV, which is capable of evoking development of immunodeficiency, reactivates and stimulates expression of latent HIV; on the other hand HIV, which is capable of reactivating latent HSV, causes development of severe immunodeficiency. On this backdrop a localized form of herpetic infection easily transforms into generalized infection, which in turn aggravates the course of AIDS and can lead to a lethal outcome. On an AIDS backdrop herpetic infection proceeds more severely, it exhibits a tendency toward generalization more often, and it yields less easily to therapy.

The basic aspects of the influence of HIV on the human immune system are presented below.

As we can see from Table 2, changes in a number of indicators of immune status in the presence of HIV and HSV infection are distinguished by a similar nature, but in AIDS patients they are more pronounced. Numerous clinical laboratory observations made on patients with herpetic infection over a period of many years show that immunodeficiency caused by HSV proceeds more benevolently than immunodeficiency evoked by HIV. This is apparently associated with the fact that productive HIV infection of T-cells manifests itself in a number of biological effects—from partial suppression of expression of the SD4 cell receptor to total lysis of these cells. Moreover both HIV itself and the cells infected by it have the ability to evoke fusion of T-lymphocytes to form giant polynucleate cells (polykaryocytes, syncytia), which then die rapidly [14,18]. In the process of replication of HIV in the infected cell, a much larger quantity of viral proteins than necessary to form daughter virions is synthesized. In this connection a large quantity of viral proteins are released as a result of lysis of infected cells. These proteins do different things to the immune system of the organism. First, they reduce (suppress) the proliferative capability and functions of T-lymphocytes; second, they evoke dysfunction of B-lymphocytes, which is a characteristic feature of AIDS (they may have both a stimulatory and an inhibitory effect); third, as was mentioned earlier, interacting with SD4 receptors of cells, they are capable of inducing their fusion and death. It was also established that if an infected T4-lymphocyte is activated, the clone of cells which it originates is distinguished by functional insufficiency. Direct death of infected T-lymphocytes and insufficient development of clones of the "immunological memory" cause profound depletion of the population of T4-lymphocytes, observed in the presence of AIDS. It should be noted that significant functional disturbances occur in the T-lymphocyte population in cases where the viability of the cells does not change [7,14,18]. Consequently complete impairment of normal function of the organism's immune system develops as a result of reproduction of HIV, which makes the organism defenseless against agents of infectious diseases, including HSV, and creates conditions favoring generalization of infection.

Thus these facts show that not only the etiological factor but also the conditions arising during development of the pathological process have important significance at the level of the organism in the development of a virus-induced pathological state. These conditions must be accounted for when determining the spectrum of action of drugs and the tactics of their use in treating the patient. This is especially important in relation to persistent viral infections characterized by constant presence of the agent in the patient's organism over a long period of time (and over the entire life span in a number of cases), and

reduction of specific and nonspecific factors of the organism's immunological reactivity and sensitization.

Pathogenic Therapy of Persistent Viral Infections

In connection with the above, besides antiviral (etiotropic) chemical drugs, immunobiological preparations that promote normalization of the cellular and humoral elements of both nonspecific and specific immunity and activate the interferon defense system play a no less important role in integrated therapy and prevention of viral infections.

Today, pathogenic therapy of viral infections foresees three approaches to influencing the interferon system and the immune system (primarily at its cellular level): first, use of resources of immunotherapy and interferon-substitution therapy (specific and nonspecific immuno- and gamma-globulins, exogenous homologous α-, β- and γ-interferon, recombinant genetically engineered interferon); second, use of methods and resources stimulating the interferon defense system (pirogenal, poludan, prodigiosan, megacin etc.); third, use of immunomodulating agents capable of stimulating and normalizing immune system function (levamisole, inosiplex, taktavin, herpes vaccine etc.) [5,10,11].

The diversity of the physiological functions of interferons discovered thus far (antiviral, antibacterial, antiproliferative, immunomodulating etc.—a total of more than 20) doubtlessly indicates that they play a monitoring and regulatory role in preserving homeostasis. The protective effect of interferon manifests itself in the early stages of infection, prior to antibody formation, and it is associated not only and, apparently, not so much with its antiviral effect as with its immunomodulating effect. The role of interferon as a lymphokinetic agent may be associated with its influence on the phagocytic activity of macrophages, on the direct cytotoxicity of T-lymphocytes, and on antibody-mediated lysis of infected cells by macrophages and leukocytes. The close interrelationship between these levels of immunity in vivo is apparently responsible for multiple amplification of the immune response under the influence of interferon. It has been shown that interferon retards development of a productive infection, but it does not affect the level of reproduction of a virus [3,28].

Table 3 provides a brief description of officinal immunobiological preparations. Analysis of clinical research conducted thus far in the presence of herpetic infection and AIDS shows that use of just synthetic and biological preparations and methods of reconstructive or substitution immunotherapy does not ensure complete recovery of patients with persistent viral infections. In a number of cases (chiefly in early stages of an infection's development) such one-sided therapy leads to temporary recovery of functions of the immune system and inhibition of the pathological process. However, persistence of viruses in the organism, their periodic reactivation resulting from the effect of different factors (excessive insolation, excessive physical loads, stresses, infectious and somatic diseases etc.), and accompanying replication of the virus in sensitive cells, including in cells of the immune system, causes a recurrence of depletion of the organism's immune forces, and development of immunosuppression at first, followed by pronounced immunodeficiency. It should be noted that in the presence of herpetic infection the nature of immunodeficiency is less malignant than in the presence of AIDS, apparently owing to the pronounced lytic action of HIV upon T-helpers and the more diverse unfavorable influence upon all elements of the immune system.

Table 3. Official Immunobiological Preparations for Pathogenic Therapy of Viral Immunodeficient States

Preparation	Diseases Against Which Recommended	Nature of Action	Means of Administration and Dose
Isoprinosine (inisoplex, inosine pranobex, imunovir)	HD, OH, HG, HS, GHI, HIV-I, AIDS	Immunomodulator	Perorally, 3-4 gm per day (100 μg/kg) for 10-15 days. In the presence of AIDS—for 4 weeks
Levamisole (decaris)	HD, OH, HG, HS, GHI	"	Perorally, 150 mg (2.5 mg/kg) daily for 3 days in a row per week over the course of 1 month (the course is repeated every 3-6 months)
Natural hormones of the calf thymus (taktivin*, timalin*, thymostimulin, thymosin, thymosin-fraction)	HI, HD, GHI, HIV-I, AIDS	"	Taktivin subcutaneously at a dose of 40 μg/m^2 of body surface, daily for 5-7 days; timalin—intramuscularly to adults at 5-20 mg daily for 5-10 days
Synthetic analogues of thymus hormones (timogen*, thymopentin, immunox)	GHI, HS, HD, HIV-I, AIDS	"	Timogen—intramuscular or intracavitary injection of 50-100 μg daily for 3-10 days. Intranasally 2-10 drops (depending on age) daily for 3-10 days
Transfer factor (IMREG)	HIV-I, AIDS, HZ	"	Subcutaneously at 25-100 μg once a week for 3 weeks
Interleukin-2	HIV-I, AIDS	Immunomodulator	From 250 to 1,500,000 IU intravenously (slowly) for 5-10 days (20,000 IU/kg)
Interferon (α, β and γ; reaferon, leykinferon*)	OH, HG, HS, GHI, HI CNS, HZ, CMVI, HIV-I, AIDS	Immunomodulatory, antiviral etc.; substitution therapy	50,000-30,000,000 IU intramuscularly or intravenously for 5-10 days

Table 3. Official Immunobiological Preparations for Pathogenic Therapy of Viral Immunodeficient States (Continued)

Preparation	Diseases Against Which Recommended	Nature of Action	Means of Administration and Dose
Pirogenal*	OH	Interferonogen	Intramuscularly at 25 MPD [not further identified], subsequently increasing the dose by 25-50 MPD; maximum one-time dose for an adult—1,000 MPD (course of treatment—10- 20 injections, interval between courses—2-3 months). Subconjunctival injections at 25-30 MPD 5 times a week (course of treatment—25 injections)
Poludan*	OH	"	Subconjunctival injections at 0.3-0.5 ml (concentration of preparation—100 μg/ml, course of treatment—3-30 injections). Combining injections with instillations (4 times a day) is recommended. In the presence of bullous keratoiridocyclitis—injection of 0.2-0.3 ml into the anterior chamber of the eye
Prodigiosan*	OH, HS	Interferonogen	Intramuscularly as a 0.05 % solution once a day for 4-7 days at a dose of 25-30 μg per injection (2-3 injections of 15-20 μg)
Megacin*	HG, HD	"	Application of 3 % ointment on mucous membrane and skin
Specific γ- and immunoglobulins	OH, HG, HD, HS, GI, HE, HGI, HI CNS, CMVI, HZ, HIV-I, AIDS	Substitution therapy	Intramuscularly and intravenously at 1.5-3.0 ml (0.05 ml/kg) every other day or daily, for 5-10 days

Consequently effective treatment of persistent viral infections in general, and of herpetic infection or AIDS in particular, can now be ensured only through the combined use of the resources and methods of etiotropic and immunocorrective pathogenic therapy. However, it must be clearly understood that even such integrated therapy of persistent infections, which ensures clinical recovery of patients, does not free the body of the infection agent.

Integrated pathogenic therapy of viral infections presupposes combined use of both chemical antiviral drugs with different mechanisms of action and immunobiological preparations (interferon, interferonogens, immunomodulators, immunoglobulins etc.) possessing different directions of action upon particular elements of disease pathogenesis. Experimental and clinical research showed that given proper combination of drugs, an additive or a synergistic effect is attained [2,8,13]. Besides producing the indicated effects, such a strategy of treating viral infections makes it possible to reduce the dose and consequently to decrease the probability of development of side effects and diminish the toxic effect of the drugs on the patient's body. The possibility of appearance of stable strains of viruses also declines. The tactics of such therapy presuppose not only parallel use of two or more medicinal preparations but also their successive administration.

At the same time this approach requires a certain amount of caution and a knowledge of the molecular mechanisms of action of the drugs, because when some of them are used jointly, they may enter into antagonistic relationships. For example ribavirin possesses an affinity toward the same cellular enzymes that participate in phosphorylation of azidothymidine and transforms it into active form. Experimental research confirmed that combined use of azidothymidine and ribavirin significantly reduces the activity of azidothymidine [9].

Researchers from the U.S. National Institutes of Health conducted clinical tests on 3,000 AIDS patients subjected to integrated therapy that include etiotropic antiretroviral chemical and immunobiological preparations, biological response modifiers, and specific drugs for treating viral and bacterial opportunistic infections and malignant neoplasms [12]. The research results attest to the high therapeutic and preventive effectiveness of such an approach. Our data, obtained during treatment of the most severe forms of herpetic infection and characterized by a high mortality rate and by disabling of surviving patients, also attest to the high effectiveness of integrated pathogenic therapy (Table 4), including chemical and immunobiological preparations. Specific antiherpes drugs we used included zovirax and viroleks (intravenously at 10-15 mg per kg body weight every 8 hours—3 times a day for 7-10 days), alpizarin (0.1 gm 4 times a day for 10-14 days); as agents of immunocorrective therapy—antiherpes immunoglobulin (intramuscularly at 6-9 ml/day for 5-7 days), leykinferon (intramuscularly at 10,000 IU once a day for 5-10 days) and timogen (intramuscularly at 50-100 μg once a day for 5-10 days).

Table 4. Results of Integrated Antiviral Chemical and Immunobiological Therapy of the Severest Clinical Forms of Herpetic Infection

Form of Herpetic Infection, Type of Course	Age Group	Treatment	Total Patients	Number of Deaths	Number Surviving	Complete Recovery	Residual Phenomena	
							Mild	Severe
Herpetic infection of the central nervous system:								
Acute encephalitis	Children	SIG + ACV or SIG + ACV + LIF + timogen	5	1**	4	3	1	0
		Pathogenic and symptomatic	18	15	3	1	1	1
	Adults	SIG + ACV or SIG + LIF	3	1***	2	1	0	1
		Pathogenic and symptomatic	9	4	5	3	0	2
Subacute and chronic encephalitis without impairment of consciousness	Adults	SIG + AL or SIG + LIF + AL + timogen	8	2	6	6*	0	0
		Pathogenic and symptomatic	7	7	0	0	0	0
Generalized herpatic infection		SIG + ACV or AL + LIF	7	0	7	7	0	0
		Pathogenic and symptomatic	8	8	0	0	0	0

Note: SIG—specific immunoglobulin; ACV—zovirax, viroleks; LIF—leykinferon; AL—alpizarin; *—stabilization of the process, **—administration of ACV was started on the 7th day of a comatose state; ***—administration of the preparations was started on the 9th day from the beginning of illness.

It should be said in conclusion that further progress in solving the problem of treating and preventing persistent viral infections is associated with the fastest possible introduction of the complex of methods into medical practice for assessing the immunological status of patients and infected persons proposed by Petrov et al. [1,6], and with scientific and theoretical development of a system of immunological monitoring of antiviral chemical and immunobiological therapy and the tactics of its periodic conduct. In addition, selecting the appropriate combinations or determining the sequence of use of chemical and immunobiological preparations is an urgent problem requiring immediate practical solution. The main strategic scientific objective in solving this problem is obviously to create methods and resources making it possible to identify cells infected with virus in latent form, and either to remove foreign (viral) genetic information from their genome or to eliminate such cells from the body. At the present stage of development of chemotherapy of viral infections, scientifically substantiated tactics entail mandatory combination and integrated use of drugs intended for etiotropic and pathogenic therapy. The specific spectrum of the drugs employed is determined by clinical manifestations of disease, by the results of laboratory tests on the resistance of viruses to antiviral drugs, by the state of the immune system and by the etiology of concurrent viral and bacterial infections.

Bibliography

1. Vorobyev, Ye. I., Petrov, R. V., Pokrovskiy, V. I. et al., IMMUNOLOGIYA, No 5, 1985, pp 5-7.

2. Votyakov, V. I. and Kolomiyets, A. G., VESTN. AMN SSSR, No 5, 1988, pp 3-12.

3. Yershov, F. I. and Zhdanov, V. M., in "Sistema integratsii vida" [A System of Species Integration], Vilnius, 1986, pp 23-33.

4. Zuyev, V. A., "Medlennyye virusnyye infektsii cheloveka i zhivotnykh" [Slow Viral Infections in Man and Animals], Moscow, 1988.

5. Kolomiyets, A. G. and Kolomiyets, N. D., ZDRAVOOKHR. BELORUSSII, No 1, 1988, pp 45-51.

6. Petrov, R. V., Lopukhin, Yu. M., Cheredeyev, A. N. et al., "Otsenka immunnogo statusa cheloveka: (Metod. rekomendatsii)" [Assessment of an Individual's Immune Status: (Methodological Recommnedations)], Moscow, 1984.

7. Khaitov, R. M., IMMUNOLOGIYA, No 5, 1985, pp 7-11.

8. Chizhov, N. P., Yershov, F. I. and Indulen, M. K., "Osnovy eksperimentalnoy khimioterapii virusnykh infektsiy" [Principles of Experimental Chemotherapy of Viral Infections], Riga, 1988.

9. Baba, M., Pauwels, R., Balzarini, J. et al., ANTIMICROB. AGENTS CHEMOTHER., Vol 31, 1987, pp 1613-1617.

10. Batish, V. K. and Prajapati, J. B., EVERYMAN'S SCI., Vol 8, 1988, pp 123-129.

11. Braun, R. and Kuhn, J., UMSCHAU, Vol 86, No 12, 1986, pp 632-636.

12. Broder, S. and Fauci, A. S., PUBL. HLTH REP., Vol 103, No 3, 1988, pp 224-229.

13. De Clerq, E., J. MED. CHEM., Vol 29, 1986, pp 1561-1569.

14. Edelman, A. S. and Zolla-Pazner, S., FASEB J., Vol 3, No 1, 1989, pp 22-30.

15. Greenberg, N. S., Friedman, H., Cohen, S. G. et al., J. INFECT. DIS., Vol 156, No 2, 1987, pp 280-287.

16. Hammer, S. M., Carney, W. P., Jacoviello, V. R. et al., INFECT. AND IMMUN., Vol 38, 1982, pp 795-797.

17. Hammer, S. M. and Gillis, J. M., J. INFECT. DIS., Vol 151, 1985, pp 544-548.

18. Levy, J. A., J. A. M. A., Vol 261, No 20, 1989, pp 2997-3006.

19. Mosca, J. D., Bednarik, D. P., Raj, J. B. K. et al., PROC. NAT. ACAD. SCI. USA, Vol 84, 1987, pp 7408-7412.

20. Ostrove, J. M., Leonard, J., Wock, K. E. et al., J. VIROL., Vol 61, No 12, 1987, pp 3726-3732.

21. Pelton, E. K., Duncan, I. B. and Denwan, A. M., NATURE, Vol 284, 1980, pp 176-177.

22. Petersen, L. R. and Balfour, H. H., in Stefanini, M. and Beuson, E. S. (Editors), "Progress in Clinical Pathology," Vol 8, New York, 1981, pp 239-267.

23. Plaeger-Marshall, S. and Smith, J. W., PROC. SOC. EXP. BIOL., (N.Y.), Vol 158, 1978, pp 262-264.

24. Plaeger-Marshall, S. and Smith, J. W., J. INFECT. DIS., Vol 138, 1978, pp 506-511.

25. Rouse, B. T. and Horshow, D. W., REV. INFECT. DIS., Vol 8, No 6, 1986, pp 850-873.

26. Sarin, P. S., ANN. REV. PHARMACOL., Vol 28, 1988, pp 411-428.

27. Shore, S. L. and Nahmias, A. J., in Nahmias, A. J. and O'Reilly, R. (Editors), "Immunology of Human Infection," New York, 1982, pp 21-72.

28. Vilcek, I., Klein, R. and Triedman-Rien, A. E., in "American Society for Microbiology: Annual Meeting, 79th," Los Angeles, 1979, p 304.

Synthesis and Biological Activity of Nerve Tissue Growth Factor Hexapeptide 52-57

927C0010A Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 25 No 1, Jan 91 pp 26-28

[Article by O.S. Papsuyevich, V.D. Bakharev, I.V. Grinshteyn, and G.I. Chipens; Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

UDC 615.357:577.175.8'17].012.1.07

[Abstract] Nerve tissue growth factor (NGF) is a polypeptide that stimulates the growth and differentiation of sympathetic and embryonic sensory neurons. Recent data have indicated that NGF also affects subpopulations of choline-activated neurons in the central nervous system (CNS) and participates in memory processes. The goals of this work were to synthesize and investigate the biological activity of NGF hexapeptide 52-57 (I) in an attempt to verify previous hypotheses about its effects. Peptide I was synthesized by traditional methods of peptide chemistry in solution. Biological test results showed that I exhibited a distinct neurotropic activity. On sections of white rat embryo spinal cord, I had a positive growth stimulating effect at concentrations of 10^{-4}-10^{-7} M, with the highest activity being observed at 10^{-5} M. In this case, I exhibited about the same effect as native growth factor from snake venom (supplied by Yu. R. Siyguriy, Institute of Physical and Biological Chemistry, Estonian SSR Academy of Sciences). However, I did not stimulate growth in PC12 pheochromocytoma cells in an NGF-specific test. Peptide I was most effective on the long-term maintenance of the conditioned passive avoidance reaction when given to rats in 200 μg/kg subcutaneous doses, but it also accelerated the onset of the defensive conditioned reflex in short-term memory tests. When 5 μg/kg were injected intracerebrally, however, I only had a weak analgesic effect. In experiments on rabbits, I had a weak adaptogenic effect (20 μg/kg intravenously) when the rabbits were exposed to cold temperatures. Figures 1; references 13: 5 Russian, 8 Western.

Synthesis and Curare-Like Activity of B-(Trialkylammonium)ethyl Esters of Thiocyanuric Acid

927C0010B Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 25 No 1, Jan 91 pp 38-40

[Article by I.V. Martynov, Yu.L. Kruglyak, V.L. Gruzdeva, G.A. Leybovskaya, L.N. Shitov, O.V. Gordybayev, V.S. Dobryanskiy, and I.I. Kashnikova; State Union Scientific Research Institute of Organic Chemistry and Technology, Moscow]

UDC 615.216.5.012.1

[Abstract] In this work, the authors synthesized and studied a group of compounded thiocyanuric acid esters containing 1, 2, or 3 B-(dialkylbenzylammonium)ethyl fragments (compound typess I-III) to determine their toxic and curare-like properties in tests on white mice and rabbits. They determined that the number of ammonium fragments significantly affected the toxicity and curare-like activity of the compounds. Compounds with one ammonium center (III) were 10-100 times less biologically active that compounds with 2-3 similar centers. These results could be considered as evidence that only two cation groups react with the receptor. The character of the the third substituent affects the extent of the myoparalytic activity. The authors found that type II compounds were less toxic and had a significantly wider range of muscle-relaxing activity than tubocurarine chloride and that they were easier to produce (from accessible and inexpensive starting materials) that natural curare. Thiocyanurates could therefore be developed as myorelaxants; however, the clinical symptomatology of these substances indicated that they have M-cholinomimetic activity, which may limit their clinical use. In view of this, the authors recommended tris(diethylbenzylammoniumethyl)isocyanurate-tribromide, a type I isocyanuric acid ester, as the most promising compound for clinical development. Figures 2; references 8: 2 Russian, 6 Western.

Synthesis and Immunotropic Activity of Thiazolo [3,2]-Benzimidazole Derivatives

927C0010C Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 25 No 1, Jan 91 pp 40-42

[Article by V.M. Dianov, S.V. Sibiryak, R.F. Sadykov, Yu.V. Strokin, and S.F. Khaybullina; Bashkir Medical Institute, Ufa]

UDC 615.275.4.012.1

[Abstract] Recent studies have shown that azole derivatives have immunoactive properties, indicating that this class of compounds can yield new synthetic immunomodulators. In this work, the authors synthesized eight new thiazolo [3,2-a] benzimidazole derivatives from 2-mercaptobenzimidazole and mono- or 1,3-dichloroacetone and studied their immunotropic properties. From tests on mice, the authors found that the derivatives suppressed the development of transplant immunity, suppressed the formation of contact hypersensitivity to 2,4-dinitrofluorobenzene (DNFB) during sensitization to an immunogenic dose of the antigen, increased antitumor resistance, and exhibited a pronounced immuno-positive effect during bacterial infection. The character of the compounds' activity indicates that their effect is realized via modulation of the function of T-suppressors, which participate in regulating cell reactions, and via stimulation of macrophage activity, which guarantees the body's resistance to infection. Figures 1; references 14: 7 Russian, 7 Western.

Asperase—Enzyme Preparation for Cleansing Wounds

927C0010D Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 25 No 1, Jan 91 pp 86-87

[Article by V.T. Chernobay, P.I. Kabachnyy, V.F. Rudyuk, L.N. Korchagina, Zh.A. Lyubetskaya, N.F. Maslova, L.I.

Dranik, Yu.N. Kiryukhin, Ye.Yu. Kolesnik, N.Ye. Vorobyev, and R.N. Savranskaya; All-Union Scientific Research Institute of the Chemistry and Technology of Medicinal Substances (VNIIKhTLS), Kharkov]

UDC 615.355:577.152.344].036.8:616-001.4-003.9

[Abstract] Asperase, a new medicinal enzyme preparation developed at VNIIKhTLS, has been approved for medical use and manufacture as an enzyme substance for cleansing dead tissue from wounds of various etiologies. The starting material for producing the preparation is a technical-grade product "Amilorizin-Pkh" (a dried, ground surface culture of *Aspergillus oruzae* mold fungus) that is widely used in the alcohol and beer industry. Asperase is obtained by aqueous extraction, separation, and fractionation with 96 percent ethanol. The active agent in Asperase is a proteolytic enzyme with a specific capability to hydrolytically cleave protein substrates. The proteolytic activity of Asperase should be 0.150-0.250 proteolytic units per mg of preparation. Asperase ointment was clinically tested on 417 patients at eight surgical and medical institutes. Asperase exhibited a distinct proteolytic effect, lysing the dead surface tissue, fibrinous formations and suppurative masses on wounds of various etiologies. It had anti-inflammatory properties, stimulated the growth of granular tissue, and did not inhibit epithelialization processes. When the ointment was used on patients, no significant side effects or toxic, irritating, or allergic reactions were observed. References: 8 Russian.

Effect of Dalargin on Reparative Capacity of Gastroduodenal Mucosa in Duodenal Ulcer Patients

927C0033A Moscow KLINICHESKAYA MEDITSINA in Russian Vol 69 No 3, Mar 91 pp 75-77

[Article by S.S. Timoshin, S.A. Alekseyenko, and A.A. Shtuka, Chair of Hospital Therapy and Central Scientific Research Laboratory, Khabarovsk Medical Institute]

UDC 616.342-002.44-[85.31:547.95:547.943]-036.8-07:616.342-018.73-003.9

[Abstract] The effect of dalargin on reparative processes in the gastroduodenal mucosa epithelia was investigated on 16 male duodenal ulcer patients aged 15 to 25 years. The patients in the experimental cohort were administered 1 mg of dalargin intramuscularly twice per day for 20 days while the control group received conventional duodenal ulcer therapy. All of the patients presented with atrophic duodenitis in the perriulcerous area and gastritis. The results demonstrated that dalargin eliminated epigastral pain in 75 percent of patients within 3-4 days after beginning treatment, and the ulcer was completely scarred over in seven out of eight patients within 20 days. No significant changes were noted in blood or biochemical analyses. In contrast, none of the ulcers healed completely in the control group, and in only three out of eight had the size of the ulcer diminished by more than 50 percent. In conclusion, these data suggest that the essential component of dalargin's anti-ulcer effect is its ability to stimulate DNA synthesis and cell division in the duodenal mucosa epithelia. Tables 1; references 18: 15 Russian, 3 Western.

Anti-Stress Effect of Delta-Sleep Inducing Peptide on Hypokinetic Stress

927C0041A Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 63 No 1, Jan-Feb 91 pp 34-37

[Article by A.M. Mendzheritskiy, M.G. Makletsova, N.I. Uskova, I.O. Chorayan, and I.I. Mikhaleva, Neurocybernetics Scientific Research Institute, Rostov University]

UDC 612.822.1+612.766.22

[Abstract] The objective of this investigation was to study the level of the neuromediator amino acids GABA, glutamate and aspartate, homocarnosine dipeptide, and GABA metabolic enzymes in albino rats (150-200 g) following the intraperitoneal injection of 12 μg/100 g of delta sleep-inducing peptide (DSIP) as an anti-stress preparation under conditions of 1 hour or 6 hour hypokinesia. The animals were placed in special cages to limit mobility. The stress of hypokinesia was measured using the level of malonic dialdehyde, a product of lipid peroxidation, in the brain. The results demonstrated that there were 39 percent and two-fold increases in the malonic dialdehyde level in the 1 hour and 6 hour hypokinesia control groups, respectively. However, the injection of DSIP to experimental cohorts 1 hour prior to the beginning of hypokinesia prevented increases in malonic dialdehyde such that figures for malonic dialdehyde levels did not differ from baseline. Analysis of the data suggests that DSIP causes changes in the brain that are aimed at stabilizing the metabolic level of the GABA system. In contrast, the injection of DSIP elevated concentrations of homocarnosine. In conclusion, the anti-stress effect of DSIP is attributed to its effect on the neuromediator system, especially inhibitory and excitatory mediators, possibly by modifying the activity of enzymes for their decomposition and synthesis. Tables 2; references 14: 12 Russian, 2 Western.

Effect of Carbocholine and Serotonin on ATPase Activity of Synaptosomes in Projection and Associative Areas of Feline Cerebral Cortex

927C0041B Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 63 No 1, Jan-Feb 91 pp 44-50

[Article by V.G. Gerasimenko, M.P. Danilenko, E.G. Zarkeshev, and O.V. Yesyrev, Physiology Institute, Kazakh SSR Academy of Sciences, Alma-Ata]

UDC 812.577

[Abstract] The effects of carbocholine (acetylcholine analog) and serotonin on ATPase activity in synaptosomes from the temporal auditory projection and frontal associative area of the cerebral cortex were investigated in 16 male cats (3.0-3.5 kg). Carbocholine and serotonin inhibit the Na^+, K^+-ATPase activity of synaptosomes at concentrations of 10^{-6}-10^{-3} M. The results demonstrated that synaptosomes from the projection and associative areas of the feline cerebral cortex differ in the absolute values of their ATPase activities and by the maximum level of Na^+, K^+-ATPase stimulation by serotonin in the presence of methysergide and Mg^{2+}-ATPase stimulation by serotonin and carbocholine. In addition, the specific inhibiting effects of muscarinic choline receptor and serotonin receptor agonists on Na^+, K^+-ATPase activity are the same in both cases. The authors attribute the inhibiting effects of the neuromediator receptor agonists on Na^+, K^+- ATPase to nucleotide impurities in commercial ATP preparations and nucleoside phosphate kinase activity in plasma membranes that phosphorylate GDP to GTP. The results do not indicate which receptor subtypes and which G-proteins are involved in the cholinergic and serotoninergic regulation of Na^+, K^+-ATPase activity. In conclusion, the high sensitivity of Na^+, K^+-ATPase and Mg^{2+}-ATPase to muscarinic choline receptor and serotonin receptor agonists indicates that they may be involved in synaptic transmission in the central nervous system. Figures 4; tables 1; references 20: 7 Russian, 13 Western.

Baroreflector Regulation of Human Circulation During Transition to Weightlessness (Simulation)

927C0094C Kiev KIBERNETIKA I VYCHISLITELNAYA TEKHNIKA VYPUSK 86 MEDITSINSKAYA KIBERNETIKA in Russian 1990 pp 53-56

[Article by B.L. Palets and L.D. Palets, Cybernetics Institute imeni V.M. Glushkov, Ukrainian SSR Academy of Sciences, Kiev]

UDC 612:51.001.57

[Abstract] The objective of this study was to develop a model suitable for analyzing human circulation under conditions of gravitational loads or weightlessness as well as analyzing the structure of regulatory homeostatic reactions. The circulation model rapidly reacts to the transition of a person from a vertical position to weightlessness, as evidenced by a 700 cm^3 increase in central blood volume, 8.1 mm Hg rise in central venous pressure, 31 percent increase in minute cardiac volume Q, and 39 percent increase in stroke volume, while total peripheral resistance dropped by 28 percent. The results showed that significant increases in central blood volume and central venous pressure can occur only when the stress of left ventricle volume is close to the maximum, and right ventricle volume exceeds the maximum. In addition, results of simulation investigations and data obtained from experiments on humans showed that the transition to weightlessness considerably decreases the tonus of resistant vessels and that increases in the minute volume are several times less than the rise in pressure in the right atrium. Thus, arterial baroreflexes during the transition to weightlessness do not hinder blood displacement to central areas, but rather significantly facilitate it, in essence generating the entire complex of negative phenomena associated with it. The findings also demonstrated that reactions of the circulatory system in different test groups to orthostatic tests are characterized by pronounced typological aspects that are naturally explained by differences in the structure and qualitative characteristics of arterial baroreflexes. Accordingly, it is possible that these differences are reflected in the reactions to the transition to weightlessness and also affect individual aspects with the use of protective devices. References 7: 6 Russian, 1 Western.

Cholinesterase Reactivators in Integrated Treatment of Acute Intoxications by Organophosphoric Insecticides

927C0176B Kiev VRACHEBNOYE DELO in Russian No 3, Mar 91 pp 96-99

[Article by V.A. Trotsevich and O.V. Kurashov, Kiev City Clinical Emergency Care Hospital]

UDC 546.18-08-039.73:557.153.4:615.285.7

[Text] Cases of acute poisonings by organophosphoric insecticides have grown in frequency in connection with chemicalization of industry, agriculture and the home. Organophosphoric insecticides are the cause of 73.4 percent of cases of acute intoxications by insecticides, and 30.3 percent of poisonings in the home [1,3]. Hospital mortality associated with acute intoxications by organophosphoric pesticides is 20-24 percent according to [2], which makes deeper study of the clinical course and methods of treating this pathology necessary. Inhibiting cholinesterase in synapses, organophosphoric insecticides cause accumulation of acetylcholine, which first stimulates and then suppresses synaptic conduction as a result of persistent depolarization. "Endogenous acetylcholine intoxication" develops as a result of inactivation of cholinesterase. "Endogenous cholinergic intoxication" leads to potentiation of postganglionic parasympathetic activity, persistent depolarization of skeletal muscles, variable ganglionic stimulation or blockade, and initial stimulation followed by depression of cells of the central nervous system. The time of cholinesterase inhibition is up to 2-6 weeks.

Specific antidote therapy, in which use of cholinesterase reactivators directed at restoring cholinesterase activity and normalizing acetylcholine metabolism plays the main role, has great significance to integrated therapy of acute intoxications by organophosphoric insecticides. Among cholinesterase reactivators, dipiroxyme, isonitrosine, dietixyme and alloxyme are most widely employed in our country. This paper presents a comparative study of the efficacy of the indicated cholinesterase reactivators in integrated treatment of acute intoxications by organophosphoric insecticides.

In 1987-1989 the Kiev Acute Intoxication Treatment Center, which was created in the city's clinical emergency health care hospital, treated 78 patients suffering acute intoxications by organophosphoric insecticides, which was around 1.6 percent of the total number of patients. The means of intoxication by organophosphoric insecticides was peroral in 61 patients (78.2 percent), inhalational in 16 (20.5 percent) and percutaneous in 1 (1.3 percent). Upon admission, 38 (48.7 percent) of the patients exhibited a severe and an extremely severe degree of intoxication (stages II-III in Ye. A. Luzhnikov's classification, 1966), while 40 (51.3 percent) exhibited mild (stage I) intoxication. Data on the structure of intoxications are presented in the table.

Degree of Intoxication	Carbofos	Metaphos	Dichlofos	Chlorofos	Total
Mild	6	-	17	17	40
Severe	20	4	1	13	38

The main initial manifestations of acute intoxication were significant visual disorders, lingual tremor, difficulty breathing, and gastrointestinal hyperactivity. Signs of intoxication developed within 30-60 minutes after exposure to organophosphoric insecticides, and revealed themselves at the maximum after 2-8 hr. Symptoms appearing 12-24 hr after exposure cannot be explained only by organophosphoric insecticides. Twenty to 25 percent of organophosphoric insecticides are eliminated in unaltered form through the respiratory tract, 30 percent are eliminated with urine, and the remaining 50 percent undergo metabolism in the liver and are eliminated with urine as metabolites.

The atropine test, which entails intravenous injection of a test dose equal to 0.05 mg/kg body weight, and up to 2 mg

to adults, has important significance to diagnosing intoxication by organophosphoric insecticides. The test is said to be positive if after the preparation's injections signs of atropinization such as hyperemia of facial skin, dryness of mucous membranes of the oral cavity and nose, dilation of the pupils and tachycardia do not develop. In such a case the indicated dose is repeated until salivation and mucus secretion decline.

Patients with acute intoxications by organophosphoric insecticides are subjected to integrated therapy. To remove organophosphoric insecticides from the digestive tract, patients were subjected to gastric lavage and to high cathartic enemas. Patients received SKN enterosorbent at a dose of 50-100 gm and petroleum jelly (200-300 ml) per os. In the case of severe peroral intoxication, gastric lavage was repeated at 4-6 hr intervals until the odor of the insecticide disappeared.

Forced diuresis was applied to all patients in order to remove organophosphoric insecticides from the bloodstream and to eliminate dissolved hydrolysis products of the organophosphoric insecticide with urine. In order to remove organophosphoric insecticides from blood quickly, 35 patients with severe and extremely severe intoxications were subjected to 61 hemosorption treatments using SKN charcoal at a total perfusion volume of 5-20 liters, a perfusion rate of 100-220 ml/min, and a duration of 60-150 min. Fifteen patients were subjected to one hemosorption treatment, 12 to two, 6 to three, and 1 to four treatments.

Atropine and cholinesterase reactivators (alloxyme, dietixyme, dipiroxyme and isonitrosine) were used in specific antidote therapy. We have not conducted intensive atropinization in the last 2 years, because it evokes paresis of the digestive tract, which promotes intensive accumulation of organophosphoric insecticides in the intestine. As a consequence the clinical course of intoxication by organophosphoric insecticides lengthens significantly, and so-called "second-wave" intoxications develop in the second through sixth days. In addition to this, elevated ectopia of the ventricles of the heart coupled with partial development of their fibrillation are noted as a result of massive atropinization. Moderate doses of atropine are administered in the initial stage of treatment, and later on in order to reduce the activity of M-cholinergic structures, including bradycardia of less than 40 beats per minute. It should be emphasized that atropine does not affect H-cholinergic receptors, including neuromuscular ones.

Cholinesterase reactivators were used only in the first day of intoxication by organophosphoric insecticides. Sixty patients were given an intramuscular injection of alloxyme at a daily dose of 0.3-1.5 gm. In the case of first degree intoxication alloxyme was injected intramuscularly at a dose of 0.075 gm every 3 hours for a daily dose of 0.15-0.3 gm; the dosage for second degree intoxication was 0.15 gm every 3 hr for the first 12 hours, followed by 0.075 gm every 3 hr, for a daily dose of up to 0.9 gm; with stage III, the dosage was 0.15 gm every 2 hr for the first 12 hours, and then 0.075 gm every 2 hr for a daily dose of up to 1.5 gm.

Dietixyme was administered intramuscularly to six patients (5.0 ml of 10 percent solution): stage I—0.5 gm every 4 hr for a daily dose of up to 1.5 gm; stage II—0.5 gm every 2-3 hr for a daily dose of up to 4.0-6.0 gm; stage III—0.5 gm every 1-2 hr, up to 6.0-8.0 gm.

Dipiroxyme and isonitrosine were prescribed to 12 patients. With stage I—dipiroxyme intramuscularly at 0.15 gm 2-3 times a day; stage II— dipiroxyme at 0.15-0.3 gm intramuscularly every 2 hr, up to 3.6 gm, and isonitrosine at 1.2 gm intramuscularly 1-2 times with a 30 min interval; stage III—dipiroxyme at 0.3 gm intramuscularly every 1.5 hr, and isonitrosine at 1.2 gm intravenously three times at 30 min intervals.

Symptomatic therapy was conducted in addition to administering the indicated drugs. Eleven patients (14.1 percent) subjected to this intensive integrated therapy died.

The efficacy of alloxyme, dietixyme and dipiroxyme hardly differed at all against mild intoxication by organophosphoric insecticides. In moderately severe and especially in severe and extremely severe cases patients began to feel better sooner after administration of alloxyme and dietixyme than after use of dipiroxyme together with isonitrosine: 0.5-1 hr and 3-4 hr respectively. Side effects (nausea) were noted in three patients with the use of alloxyme. Two patients exhibited dyspeptic phenomena after administration of dietixyme: eructation, nausea, heartburn, pains in the epigastric region; three patients suffered enlargement of the liver by 0.5-1 cm below the right margin of the costal arch. When dipiroxyme was prescribed together with isonitrosine, dyspeptic phenomena were noted in five patients, toxic liver pathology was noted in six, and impairment of intraventricular and atrioventricular conductivity was noted in seven.

Thus preference should be given to alloxyme in integrated therapy of acute intoxications by organophosphoric insecticides, especially in severe and extremely severe cases. Side effects taking the form of toxic liver pathology are observed most often after administration of dietixyme. The results indicate that treatment with dipiroxyme combined with isonitrosine produces a lower impact, and side effects are noted more often.

Bibliography

1. Kogan, Yu. S., "Obshchaya toksikologiya pestitsidov" [General Toxicology of Pesticides], Kiev, Zdorovye, 1981, 345 pp.

2. Luzhnikov, Ye. A. and Kostomarova, L. G., "Ostryye otravleniya: Rukovodstvo dlya vrachey" [Acute Intoxications: Handbook for Physicians], Moscow, Meditsina, 1989, 432 pp.

3. Sidorenko, Ye. N., "Otravleniya pestitsidami" [Intoxication by Pesticides], Kiev, Vyshcha shk., 1978, 29 pp.

New Principles for the Training and Retraining of Specialists With a Higher or Mid-Level Medical or Pharmaceutical Education in BSSR

927C0005A Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 91 pp 4-7

[Article by V.S. Kazakov, BSSR health minister; V.V. Shilo, head of the BSSR Ministry of Health Administration of Training and Utilization of personnel; and A.I. Kurbarko, rector of the Minsk Medical Institute]

UDC 614.23(476)

[Text] The critical situation that health care finds itself in is due chiefly to the weak material-technical base, the poor drug supply, the left-over principle of financing, the absence of a preventive slant, and the poor quality of the occupational training of specialists. Until now, the extensive method has been used in the training of medical personnel, and there has been no sound approach to determining the functions of the physician and the mid-level medical worker. The current structure of the republic's health care sector and the organization of the provision of medical care to the public need reexamination and revision. The level of training and retraining of medical personnel must result in the kind of qualified medical care that is typical of the countries of Western Europe, and it must guarantee the competitiveness of specialists in a market economy both in our country and abroad.

The new approaches to the organization of medical and pharmaceutical education today call for the solution of a broad range of problems, the central problem involving replacement of the current principles underlying the functioning of educational institutions and the development of new methods, forms, and means for them to interact with practical health care and other sectors of the economy. The transition to the training of highly skilled specialists must rest on the basis of a strengthening of the professional teaching staff, the democratization and humanization of medical education, and the reequipping and strengthening of the material-technical base of educational institutions.

Looking upon the improvement of the occupational training of specialists with a higher or mid-level medical or pharmaceutical education as a decisive factor in raising the quality and standards of the provision of medical care, the BSSR Ministry of Health, together with interested agencies and institutions, has implemented a number of measures in recent years to improve the organization of the work being done in that area. In accordance with new educational programs, medical institutes are geared to training general-practice physicians, and medical schools [uchilishcha], to training mid-level medical workers not only to carry out doctors' orders, but also to perform nursing duties.

To accomplish that, the ratios of general theoretical courses to clinical courses have been changed to favor the latter by 10 percent, opportunities for independent study by the students have been expanded, cyclical methods have been introduced for conducting classes, and a number of new approaches and techniques have been adopted for teaching special and sociopolitical subjects.

As is known, the republic's medical institutes are highly ranked in terms of the quality of training given to specialists, and the Minsk Medical Institute is among the top five in higher educational institutions in the country. The Minsk Medical School No 2, according to 1989 results, was ranked first among more than 600 medical schools in the country.

However, in spite of isolated successes, a radical breakthrough in the perestroyka and development of higher and mid-level schools has not taken place in the republic. One of the hindrances to the improvement of occupational training is the continued overadmission of matriculants to educational institutions, with student enrollment too large for the teaching and clinical base. Even if admissions were cut back for the next 2-3 years, there would be around 50 physicians per 10,000 population by 1997 (it was 40.6 per 10,000 in 1989). But with that, one could hardly expect the achievement of high-level medical care. In developed countries of the world that have rather high-level medical care, there are 15-28 physicians per 10,000 population. General practice physicians and family doctors predominate. But in our country, narrow specialization is prevalent in the structure of physician training. Physicians who are capable of evaluating the state of health of the human body as a whole are becoming fewer and fewer. So who, in the near future, will be treating the sick individual? Unfortunately, until now, medical educational institutions, in satisfying the will of their clients, were forced to make a narrow specialist out of someone who wasn't even a full-fledged physician. No such accelerated training of specialists—not to mention narrow specialists—exists in any other country of the world. That's why the BSSR Ministry of Health has reexamined certain issues and has decided to make the transition soon to new principles for the training and retraining of specialists with a higher or mid-level medical or pharmaceutical education.

Plans are that the training of physicians be done step-by-step. Such training calls for the following: **basic physician training; general-practice training; narrow specialty training; advanced training, retraining, and periodic certification of specialists.**

Basic physician training is done in medical academies and institutes for six years (stomatology faculty, five years). Graduates are certified by a state commission and receive a doctor's certificate.

The training itself is done in several stages. The first stage includes training in medical subjects such as biomedicine, for a period of two years, and is completed when the student passes state examinations (the state test) pertaining to normal anatomy, histology, biochemistry, and normal physiology.

Every student undergoes certification by a special certifying commission, and on the basis of that, the student is allowed to go onto the next stage in the institute or is transferred (with his agreement) for further medical education to a mid-level special medical education institution or is dismissed without any right to reinstatement.

The second stage includes general medical training, for a period of three years, except for stomatologists, for whom it is two years. The second stage also ends with certification of the student, and based on the results of his theoretical and practical training, he is allowed to either go onto to further training to receive his doctor's certificate or is permitted to take examinations and practical-skills testing to receive a mid-level medical worker certificate.

The third stage is the final stage in the clinical and preventive-medicine training (it lasts one year). It ends with examinations and practical-skills testing by the state examination commission.

In the event that, for some reason, a student fails one or several state examinations, he can retake the examinations in those subjects a year later. In the interim, he must spend 11 months working in a medical facility as a mid-level medical worker or pharmacist.

After receiving basic physician training, the physician must be a capable individual in rendering emergency care and must serve as an intern under the supervision of qualifying general-practice physicians or physician-specialists.

The basic training is done to be done on treatment-and-prevention faculties or stomatology faculties.

In light of the extremely poor ecological/radiation situation in the republic, as a mandatory measure, the training of physicians involved in preventive medicine (preventive medicine physicians) is being done on a preventive medicine faculty until the year 2000.

General practice training is given over a period of two years by medical institutes and academies, institutes and faculties for advanced training, and practical health care organs for individuals who have received their basic physician training.

During the first year, the probationary physician [intern] undergoes training at a general hospital with at least 300 beds and at polyclinics and large health/epidemic-control facilities (in the context of an internship).

During the second year, the intern undergoes training in rural district hospitals, outpatient clinics, health centers, and health/epidemic-control facilities under the supervision of highly skilled physicians from republic-level, oblast, and rayon health care facilities, with periodic monitoring of the internship by pedagogic staff members of medical educational institutions.

Upon completion of the training, the intern is awarded his qualifications (as a general-practice internist, general-practice pediatrician, general-practice preventive-medicine doctor, or general-practice stomatologist), which are confirmed by a certifying commission and the issuance of a certificate.

The title "general-practice physician" gives an individual the right to hold medical and administrative positions that conform to his qualifications.

The request of a practical health care organ or institution can initiate two-year-long **biomedical specialist training** (to produce pathologic anatomy specialists, forensic medicine specialists, etc.) for an individual who has undergone basic physician training, or it can initiate two- to three-year-long **narrow specialty training** for a general-practice physician who has been working at least one year. Such training is done in medical educational institutions, large treatment-and-prevention facilities, or scientific research institutes. At the end of the training period, the student's qualifications are also confirmed by a certifying commission and the issuance of a certificate of the proper form for the medical degree. A physicians who receives an unsatisfactory grade on his certification examinations can, with a directive from a health care organ, repeat the cycle of training and retake the certification examination. Until he retakes the exams, the physician can work either as an intern or as a general-practice physician at the corresponding pay.

Retraining and qualifications maintenance and advancement for medical and pharmaceutical specialists with higher education are done in new medical specialties and subspecialties for the rapid and early provision of qualified personnel in the newest areas of the technological and scientific-technical process of the sector; in the specialty of "social medicine and health care management" and its subspecialties in the transfer (or placement in backup status) of workers from line "specialist" positions to "management" positions (to include chief specialists and department heads).

In medical specialties and subspecialties, the retraining is done when managing workers and specialists of the health care management apparatus are transferred to a different sphere of activity for purposes of staff cutbacks, when there is a need to replace a medical specialty or subspecialty for medical reasons, and when the job duties are expanded for physician-specialists of health care facilities and associations that have changed over to the new economic conditions, depending on the operating features of the organization of medical care for the population in the territories assigned to those facilities and associations.

The procedure for obtaining a certificate is similar to the procedure given above.

Qualifications maintenance and advancement is effected through a combination of various types of continuing education set up by educational institutions and subunits and local educational facilities and at the place of work with systematic self-teaching and constant practical work in a given specialty or subspecialty or through an internship abroad.

To keep his qualifications, a physician must go through the appropriate cycle of qualifications advancement or specialization once every five years.

Qualifications advancement is done in the context of a directive by a health care organ or facility.

Periodic certification of specialists is done by certifying commissions, in the context of a directive by a health care

organ or facility, at the request of a physician who has at least of five years of practical experience as a general-practice physician, a pharmacist, a physician-specialist, or a pharmacist-specialist. Depending on the results of the certification, the physician being certified is awarded the first certification category or the higher certification category in his specialty. Assuming the individual passes the practical and theoretical certification tests, the higher category is awarded only if the individual has already been awarded the first category at least five years before. The certifying commission can lower an individual's category, take it away, or deprive an physician or pharmacist of the physician-specialist or general-practice physician certificate. An individual whose certificate has been taken away because he failed to satisfy the qualifications requirements has the right to go through certification again, including for qualifications category, within a year with a directive from a health care organ or facility; until that time, he can work as a general-practice physician or an intern, at the corresponding level of pay.

The above tasks can all be achieved if a new mechanism is created for providing physicians with the proper occupational skills.

The new system of management is meant to do that. It includes training and retraining physicians and pharmacists and subsequent maintenance, advancement, and monitoring of their qualifications and calls for the use primarily of economic methods and the use of incentives for productive work by collectives and individuals of educational institutions. A changeover is planned to a new principle for financing educational institutions based on compensation for actual costs of training specialists. New approaches are being introduced in the provision of economic incentives for the work done by instructors, and those approaches call for setting up material-incentive funds, extra pay for high-quality or hard work, and bonuses. A change will take place in the structure of management and all the basic components of the management process: planning, finance, and quality control of training; evaluation of educational institutions, their subunits, and their employees; employee wages and material incentives; additional material incentives for good and excellent training; and funds for the social protection of students.

Guaranteeing that physicians have the proper skill levels in terms of end results is irrefragably linked to the creation of a system of economic, social, and administrative-legal incentives for physicians, which includes the following:

new principles underlying wages and material incentives for physicians as a function of their qualifications, their professional skills, and the end results of their work;

changeover from intermittent occupational training of physicians and pharmacists to continuous training;

introduction of the general-practice physician and physician-specialist certificate.

Physician salaries are also being planned on the basis of qualification level. The first-year intern will get a monthly salary of at least 200 rubles (R); a second-year intern, at least R250; and the physician specialist and the general-practice physician, at least R350. The first-category physician specialist and the first-category general-practice physician will get a salary 30 percent higher than the base salary; and the second-category physician specialist and the second-category general-practice physician, a salary 50 percent higher than base salary.

Plans call for training similar to that of the physician for medical and pharmaceutical workers with mid-level medical or pharmaceutical education, based on the specifics and prospective status of the specialist.

Individuals who have completed in the republic an entire (three-year) course of a medical school at a middle school can, in the range of 90 percent of institute admissions, enroll if they wish in the first year of a medical institute.

Medical schools provide three-stage training of specialists with a mid-level special medical or pharmaceutical education.

In the first stage, individuals who complete the first year but do not pass the exam for advancement to the next stage are given certificates as junior nurses or are dismissed from the educational institution with no right to reinstatement.

The second stage concludes with the award of a certificate for general nurse, laboratory technician, dental technician, pharmacist, etc., to the student who completes the second year or with advancement to the next year of study.

In the third stage, students who complete the third year are given a certificate for obstetrician assistant, laboratory assistant, doctor's assistant, senior dental technician, or senior pharmacist, with a specific status and economic incentives; certain students who pass additional exams can enroll in medical institutes in the republic, without taking entrance exams, based on their test scores. The procedure for enrolling is determined by the medical institute in an agreement with the ministry of health.

Mid-level medical and pharmaceutical specialists undergo retraining, instruction, and certification in a manner similar to that of specialists with higher medical education.

Four-year training of nurses with higher education is being organized at one of the republic's medical institutes. Individuals who graduate from such an educational institution can hold the post of chief nurse at any treatment-prevention facility, can head a medical school [uchilishche], and can teach in mid-level medical educational institutions.

The changeover of the sector to the new principles for training and retraining physicians, pharmacists, and specialists with mid-level medical or pharmaceutical education and for monitoring their qualifications is being done step-by-step beginning with the 1991/1992 school year as the necessary conditions are created, as the new economic mechanism is introduced into health care, as we switch over to insured medicine, and as the new approaches are

effected in the organization of the provision of medical care to the people of the republic.

The complete changeover is planned to be finished within the next five years with the creation in the future of the conditions that are needed for physicians to take the international certifying commission examinations in order to legitimize the degrees given to Belorussian specialists in the eyes of the developed countries of the world.

In light of the critical ecological situation in the republic and the cleanup efforts at the Chernobyl Nuclear Electric Power Plant, all specialists who graduate from medical education institutions in other regions of the country are allowed to practice medicine in the republic only if they pass a knowledge and skills test given by a special certifying commission and receive the proper certificate.

Structure of the Dermatovenereology Service in the New Economic Mechanism

927C0005B Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 91 (manuscript received 17 Nov 90) pp 32-33

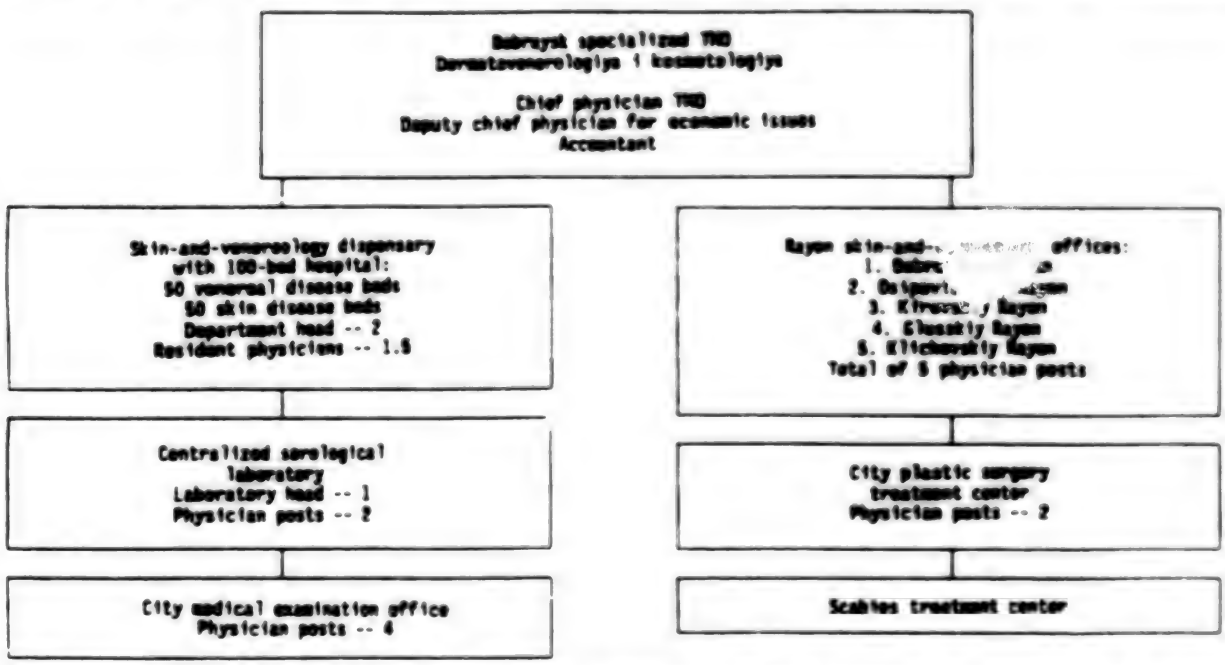
[Article by G.P. Chernookiy, Bobruysk City Skin-and-Venereology Clinic, Mogilev Oblast; first paragraph is author abstract]

UDC 362.147:616.5+616.97]:614.2(476.4)

[Text] **The article presents the organizational structure of the specialized territorial medical association (TMO) in the context of the operation of a city skin-and-venereology dispensary with a 100-bed hospital serving a city population of more than 240,000 people and the population of five attached rayons with more than 160,000 people. The TMO includes a plastic surgery treatment center. Key words: territorial medical association, skin-and-venereology dispensary.**

Dermatovenereology facilities will have to operate in the new conditions in 1991. The difficulty associated with the operation will consist in the fact that health care organs higher up have always considered that service to be of secondary importance. That is why, as a rule, dermatovenereology facilities get negligible sums for the treatment of patients, which prevents them from providing the full range of treatment. On the other hand, some managers feel that they can deal with skin diseases without specialists, which is why some recommend having a dermatologist/venereologist in every polyclinic, while others suggest reducing the number of dispensaries and converting them to city hospital departments, because they forget that many skin diseases have been serious lately and have yielded to therapy slowly. If that were to happen, the dermatologist/venereologist would have to handle not only treatment, but also prevention of skin and venereal diseases.

In many cities, including ours, territorial medical associations (TMOs) have been set up recently and are functioning. They combine general medical facilities under the territorial principle or work specialty. Many approve such a structure—pediatricians and obstetrician-gynecologists, for example—because they are consolidated in the same TMO according to work specialty. There are some negative comments about TMOs when they are consolidated



Structure of specialized territorial medical association Dermatovenerologiya i kosmetologiya operating with the new economic mechanism

according to the territorial principle (women's clinics, children's polyclinics, stomatology polyclinics), because such consolidations are of little benefit to either the patient or the medical worker.

That is why we suggest setting up a specialized territorial association with the attachment of the plastic surgery treatment center, medical examination offices, and skin-and-venereology offices of five attached rayons (the structure is presented in the figure). That would make it possible to more effectively carry out work in any of the subunits. Clinical and serological laboratories would be able to promptly identify venereal disease patients, as well as test for AIDS in a timely, high-quality fashion.

The physicians of the rayon skin-and-venereological offices are part of the specialized TMO. They would be able to improve their skills in a hospital or dispensary department, which would have a positive effect on the skills of the rayon specialists. Under the guidance of the specialized TMO, preventive work could be done systematically and on a regular basis at enterprises and in facilities, as could health education.

Dissociating skin-and-venereology dispensaries in cities and breaking up skin-and-venereology offices in rayon centers would bring irrevocable harm to the skin-and-venereology service and to those patients.

At the Board of the BSSR Ministry of Health

927C0005D Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 91 pp 72-74

[Article by N. K. Deryugo, Minsk, under the rubric "In the BSSR Ministry of Health"]

UDC 614.2:061(476)

[Text] The regular board meeting of the BSSR Ministry of Health was held on 23 January 1991, and the question of the work of the Belorussian Scientific Research Institute of Oncology and Medical Radiology was considered.

The meeting was led by First Deputy Health Minister N. I. Stepanenko.

The report of Ye. A. Korotkevich, director of the Scientific Research Institute of Oncology, explained that there are 12 oncology dispensaries in the republic that perform diagnosis, treatment, and record-keeping (I repeat, record-keeping) of patients with malignant diseases. All that work is headed and coordinated by the Scientific Research Institute of Oncology and Medical Radiology. The institute has a research sector as well as a treatment sector, although, because of the changeover of health care to the new economic methods (with salaries in the treatment sector now considerably higher), many researchers have begun to switch to practical work. That is having a negative effect on the work of the research sector.

The report noted that the institute's employees have successfully completed the research associated with the republic oncology program. A total of seven doctoral dissertations and 12 candidate dissertations have been defended, and three monographs of research have been published, as have five collections of research papers. All that was done in one five-year plan.

All the recent activity of the institute has been geared to a study of radionuclides and their link to the appearance of malignant tumors among the populace in contaminated regions. It is difficult to corroborate that the number of malignant tumor patients has grown in those regions, but on the whole in the republic, oncological morbidity has increased by 33.5 percent over the last 10 years, i.e., 253 cases per 100,000 population (1990). The number of hospitalized patients needing special treatment has grown by more than 50 percent, and the number of patients with neglected forms of the disease has risen.

Early detection of oncological disease is not going very well in Minsk Oblast. Diagnosis is in the late stages of disease in more than 26 percent of patients.

Much was said at the board meeting about the shortage of oncology beds, dispensaries, treatment-and-diagnosis centers, proper equipment, and medical personnel (oncologists) and the low levels of competence in oncology among various physicians, especially district physicians, who constantly see such patients.

The reports given by S. I. Leonovich (chief surgeon of the republic), Prof. Ye. P. Demidchik (head of the Department of Oncology at Minsk Medical Institute), P. N. Mikhalevich (head of the section for organizing medical care for the public), and chief oncologists and chief physicians and other specialists noted that, essentially, nobody but oncologists deals with oncology patients. But because in most rayons, either there are not oncologists or they work (mainly, they are just listed) at two or more jobs, the level of preventive examinations for the purpose of detecting oncological pathology is extremely low. The continuity of treatment and rehabilitation of oncology patients between oncologists and physicians of the general system has been broken. Research advances are not making their way very well into practical health care because there is too big a gap between research and practical implementation of it. That is why general physicians have not mastered the new methods of diagnosis and treatment. Which is why the frequency of detection of tumors in stages I and II is no greater than 45 percent (1989), and the frequency of such detection in preventive exams is only 7 percent. Physicians in polyclinics, district hospitals, and outpatient clinics seldom use the simple tests that are accessible everywhere for examining breasts, skin, the rectum, etc.

In many general-treatment facilities in the republic, surgical interventions for malignant tumors are still not being performed often enough, which is resulting in a 100 percent recidivism rate.

The lack of knowledge of oncology among general physicians, the lack of coherence in the work done by the Belorussian Scientific Research Institute of Oncology and Medical Radiology and the oblast and rayon dispensaries, the absence of a program for training oncology specialists

via subresidency and residency, and the poor pay received by such specialists has led to a twofold reduction in the rate of detection of disease in early stages, a reduction in treatment to prevent recidivism, and an increase in the number of patients who haven't received any special treatment whatsoever.

In summing things up as to the provision of oncological care for the populace, Deputy Health Minister N. I. Stepanenko noted that a great deal of work needs to be done yet in the Ministry of Health and in the Scientific Research Institute of Oncology and Medical Radiology and the oncology dispensaries to improve the quality of care being given the public.

The BSSR Ministry of Health has published an order concerning improvement of the work of the Scientific Research Institute of Oncology and Medical Radiology, and that order addresses the shortcomings in the institute's work, the responsibility of the general-treatment network for timely detection and the subsequent fate of oncology patients, and the transfer of the functions of mass health screening of oncology patients to the general-treatment network. Now the dispensary observation of oncology patients will be done by district physicians and oncologists of the rayons. They have been given the right to refer such patients for treatment to oncology hospital facilities.

The order forbids routine cancer surgery to be performed in general-surgery hospital facilities and calls for the implementation of a number of other important points aimed at improving the operation of the oncology service of the republic. But the question of how to handle patients who are inoperable and need only nursing care remains unresolved. Those patients have been forgotten by everyone: the Institute of Oncology and Medical Radiology, the chief specialists of the ministry and oblasts, and the Main Administration for Medical Care of the BSSR Ministry of Health. Nor does the order mention them. And that is too bad, because they are a lot of them, and they need a lot.

Also unresolved in the question of treatment. It was ascertained that the number of malignant tumors grew by 33.5 percent, whereas the diagnosis of tumors made little headway, because narrow-field specialists and district physicians know almost nothing about the field of oncology. Nothing was said at the board meeting about how the Scientific Research Institute of Oncology and Medical Radiology and the Main Administration for Medical Care think those problems should be solved. After all, it is a well-known fact that identification of primary patients with early forms of oncological disease is important today. That is especially true in regions contaminated with radionuclides. And those are the very places where various unprecedented cases can appear.

The editorial offices recently received a letter from Gomel from an M. F. Savenok, who said that her daughter, L. V. Savenok (18 years old) had died of a malignant tumor of the lungs through the fault of the physicians of Gomel Polyclinic No 11. The girl had seen district physician L. I. Zarutskaya many times and had consulted with x-ray specialist Ye. T. Pinchuk, and they treated her for a total of six months for acute respiratory viral infection. And only after she developed jaundice did they admit her, to an infectious hospital, with viral hepatitis, and there the hospital physicians managed to keep her alive for a whole month and then released her with the recommendation that she go to a tuberculosis dispensary.

I have no doubt that there were higher-category specialists both in the polyclinic and in the infectious ward. Could it really be that for seven months the proper diagnosis couldn't be made? Have we forgotten how to work, are we really so backward? The sad thing is that over that whole period of time, the mother never found out what had happened with her daughter, what she died from. Apparently, nobody found the words to explain to the mother what had happened. Could it have been indifference to someone else's sorrow?

In concluding this small report about the state of oncology care for the public, I would like to see all physicians turn to their patients and not lose their kindness, charity, or sense of compassion in the process of our perestroyka.

Responses to Drug Shortage

USSR Cabinet of Ministers Prepares Decree

927C0025A Moscow TRUD in Russian 15 Jun 91 p 1

[Article consists of information from unnamed, but informed sources; this and other related articles here are a continuation of a discussion started in an 18 May 1991 TRUD article, "A Country of People Who Are Dying Out?"]

[Text] On 22 May—several days after an article with the headline "A Country of People Who Are Dying Out?"—the USSR Cabinet of Ministers discussed the issue of emergency measures to provide the population with drugs. The appropriate decree is being prepared. In the meantime, the following decision has been adopted: all hard currency designated for barter will remain at the disposal of enterprises if it all goes for the purchase of medications.

Trade Unions Address Enterprises

927C0025B Moscow TRUD in Russian 15 Jun 91 p 1

[News item, no byline: "Trade Unions Sound the Alarm"]

[Text] **From an appeal by the Federation of Trade Unions of Health Care Workers to collectives at enterprises:** "The state of the drug supply is perilous. Such vitally important preparations as oncological, psychotropic, diabetic, and hormonal preparations are being manufactured in extremely limited quantities. Things are even worse with vitamin preparations for children. The statewide programs Chernobyl, Aral, and Materinstvo [Motherhood] are in danger of being halted. Aware of the complexities of our country's economic state and of the difficult financial position that enterprises find themselves in, we call for some of the funds associated with the conclusion of barter agreements and with the allocation of hard currency for the purchase of industrial goods and foodstuffs to be channeled into medications."

Health Minister Comment

927C0025C Moscow TRUD in Russian 15 Jun 91 p 1

[News item, no byline: "Minister Gives Assurances"]

[Text] To a question raised by a TRUD correspondent about the drug situation, USSR Minister of Health I. Denisov responded with this: "I am an optimist. We can achieve improvements if there is stability in society. Don't forget that we have more physicians and hospital beds than any other country in the world....By the year 2000, every individual will be able to see any kind of doctor he wants...."

[Boxed item] NOTICE: If timely payment is guaranteed, foreign firms from the United States, England, Italy, Spain, Finland, FRG, and Japan are prepared to proceed with the delivery of drugs to our country. USSR Ministry of Health current account: No 901594144 in the All-Union Soyuzsovraschet Association of the USSR Foreign Economic Bank. Communications about the allocation of hard currency should be directed to the All-Union Soyuzfarmatsiya Association: 101668, GSP [not further expanded], 4, Moscow, Pushkinskaya Street, Building 7. Telephone: 292-48-48 and 927-24-13.

Reader Response to TRUD Article

927C0025D Moscow TRUD in Russian 15 Jun 91 p 1

[Text]

Hostages of Death

Our resuscitation team got an emergency call: an individual was dying as a result of a severe injury. We turn on our flashing lights and rush down a major street with the timid hope that we will be able to save the individual. Alas, front-line teams often lack the basic necessities! But the individual's blood pressure, as we were told, was 70 over 50.

This time, you could say, a miracle happened: the emergency physicians, quite by accident, happened to have a small bottle of the scarce Polyglucin. Unfortunately, that's rarely the case. Often, we don't have the most basic preparations or drugs, like pain killers—the physicians can't even just relieve an individual's suffering.

Disposable syringes are scarce. Sometimes we have to give injections...with dull needles. Every morning, the heads of the substations remind the physicans: "Analgesics are very short—use them sparingly!" And hormones, which are simply irreplaceable in shock—as is euphellin [eufellin] in asthma attacks—is also short. We have to use them sparingly....

And I can't help thinking, Could it really be that our state, because of the shortage of drugs, is changing into a country in which medical people might very well be hostages of death?!

B. Litovskiy,
Physician/resuscitation specialist at a city first aid station
Nizhnyy Novgorod

We Are Dying, Just Like in a War

I, Kseniya Dmitriyevna Makarova, live (for the time being, I'm living) in Kaluga. I live alone. My son, my husband, my close relatives have all died from various diseases. My son Serezha had returned last year from the Army. A month later, he suddenly died. They had diagnosed him wrong in the hospital. Instead of his heart, they treated his kidneys....My husband, Nikolay Vasilyevich Makarov, had survived the war. Until recently, he had had no complaints about his health, and suddenly he was out with a cold. I got some drugs from the pharmacy with a prescription. By the next morning, my husband was no more. The tablets turned out to have been spoiled: the pharmaceutical association had let spoiled tablets get by. But no criminal proceedings can be brought against anyone. According to the law, that can be done only if spoiled drugs are allowed through more than once. But a person dies only once....

I'd like to ask, Why have they been tearing those taxes away from us all our lives for free medicine?

K. Makarova,
Kaluga

Even Iodine Has to Be Borrowed

Six months ago, I broke my leg, and I've been on crutches all this time. The pain can be incredible, but there's nothing to dull it. When I was in the hospital, things were a little easier—there, at least, they would give me a shot of something. But now, left to deal with the pharmacies one on one, I've come to know what it is to be ill. What can you say about pain relievers when there isn't even any analgin? You have to "look around" for everything or borrow it. Even iodine. And that's in Kiev, where the entire pharmaceutical industry is located—the Darnitsa association, a medical preparations plant, and a biological preparations factory. They say the equipment is worn out and there aren't enough raw materials....

L. Shakhray,
Accountant
Kiev

The Cells Aren't Staying Empty...

The pharmacy counters, it turns out, just look bare. In a surprise check done in 1990, it was found that more than 9,000 rubles worth of drugs had been put aside in three oblasts of the Ukraine. True, drugs can be obtained, but not by prescription—but for a "certain price." Every third pharmacy visitor said that in a survey conducted by the USSR State Committee for Statistics. And to make sure everything's all tidy, there's the widespread practice of issuing prescriptions to dead people. A check of just the RSFSR established that 25 percent of all prescriptions are written without any basis, and 17 percent are written for fictitious persons. The annual losses from such a "practice" works out to be something in six figures or more. Every year, thousands of physicians change their white coats for prison stripes. And do you know what? The number of crimes, unfortunately, is virtually the same. If in 1988, a total of 1,928 thefts were recorded, in 1989, the figure was 1,967. The figure was about the same last year....It's not hard to imagine that, as a result of that kind of pillaging, someone has been deprived of some needed tablet that would have saved his life.

What a sad situation. Essentially, no sooner than we put someone into a prison cell, some other thief takes his place outside.

A. Churilov,
Senior department prosecutor
USSR Prosecutor's Office for Oversight of Observance of Laws and for Protection of the Rights of Citizens in the Social Sphere

And I Know Why...

The article "Country of People Dying Out" told how an individual who didn't have the proper drugs died in a hospital. Honestly, when you read something like that, it eats your insides out. But in real life, a cold indifference envelops your heart. I work in a hospital myself. I'll tell you frankly, I put tablets aside for myself. A patient lets out a cry, and I simply look him in the eye, even though I have a box of powder hidden away. Of course I understand I'm doing a vile thing. But when my son has to go to school in a shirt that's been patched over and over again, and I can't buy him a new one because of my miserly salary, what else can I do? Whether you cure a patient or not, it's all the same—you still get the same few crumbs for it. All the newspapers are always extolling the Interbranch Technical Complex Mikrokhirurgiya [Microsurgery]. Leasing. Stocks. Interested parties. Quality of care. But where is any of that in your everyday, provincial hospitals? Sometimes I get scared. What if I suddenly get sick in some other city and have to go to the hospital? I try not to get too far away....

P. N.,
Internal medicine specialist
Smolensk

Stock Exchange Funds Pharmaceuticals in Yuzhno-Sakhalinsk

927C0026A Moscow MEDITSINSKAYA GAZETA in Russian No 32, 29 Aug 91 p 3

[Article picked up from TASS: "...Drugs From the Stock Exchange"]

[Text] The personnel of the neurological department at the Yuzhno-Sakhalinsk City Hospital are not worried about how they're going to manage with the strict ceiling placed on the money released for acquiring drugs. The Tymovskaya Stock Exchange, confidently announcing itself in the domestic business world, helped the medical people buy what they needed of the drugs.

The exchange's profits helped its associates continue the fine tradition of Russian entrepeneurs—to engage in philanthropy. But the general director of the exchange, N. Bandura, decided not to transfer the money to "faceless" funds, but to give help to a specific health care enterprise.

All 50,000 rubles were spent on the purchase of needed drugs. They should last the department almost a year. The stock exchange is ready to get the hospital various medical equipment worth another 50,000.

Contracts Worth $25 Million Signed at 'Hospital-91' Exposition

927C0026B Moscow IZVESTIYA in Russian 16 Oct 91 Union p 2

[Article by L. Ivchenko: "It Looks Like There Will Be Drugs"; first paragraph is source introduction]

[Text] **Contracts worth $25 million were signed in the very first few days of the international exposition of medical equipment, Hospital-91, which opened in Krasnaya Presnya.**

Although such expositions have already become commonplace, the leaders of Union and Russian-republic health care are describing this exposition as one of unprecedented scale: 420 firms from 20 of the world's countries have brought their new items in! And that in this most difficult of times for the country, despite the debts we still owe to our partners and the problems we're having closing new agreements. Just one short list of the exposition's participants and the products they have on display takes up 162 pages of the catalog. Presnya couldn't accommodate all those who wanted to come. After the putch, according to the organizers of Hospital-91—representatives of the Swiss firm MORAG—an additional 50 firms announced their desire to participate in the exposition, but only 20 of them were allowed in. The organizers didn't have enough room for the others.

"The firms are looking to the future," says Grajina Schreiber (of MORAG), a regular organizer of expositions of medical equipment. "Yes, they're spending a lot, without any guarantees of success. But they're geared not to difficulties, but to the scale of activity to come. If they don't buy today, they buy tomorrow; if they don't buy tomorrow, we'll create joint venture and manufacture equipment and drugs together."

In a word, the distinguishing feature of this exposition is the participation of 60 joint ventures. Just three years ago, at the exposition Health Care-88, there wasn't a single joint venture. But now they're displaying computer tomographs, ultrasound diagnostic equipment, incubators for newborns, and many other kinds of equipment needed by health care. The participants in this exposition have not only a great many new medical items, but also a great many new ideas for collaboration.

Among our guests are newcomer firms, as well as regular participants in such expositions, firms that have collaborated with our country for decades—e.g., Siemens, Johnson & Johnson, Phillips, Iskra, Toshiba, and many others. Most of the people in our country know Phillips and Toshiba, for example, more for the household radio and television appliances they manufacture, and only specialists are aware of the fact that they produce medical diagnostic systems and equipment for radiation therapy and x-ray examinations, including computer tomographs and nuclear-magnetic resonance systems. That equipment is being acquired from them right now by enterprises, medical facilities, and hospitals that have sponsors or have their own money. Drugs have been purchased from Bayer and other companies.

Their business interests aside, the medical businessmen sincerely want to help the people of an immense country going through hard times. A fund has been created for giving humanitarian aid to the people of remote regions of Russia that are badly in need of medicine and medical equipment.

Cooperative Offers Herb Claimed to Reduce Insulin Need

927C0026C Moscow ARGUMENTY I FAKTY in Russian No 38, Sep 91 p 8

[Commentary by T. Trumpe, candidate of biological sciences and senior research associate of the department of pharmacology at the scientific production association VILR, in response to question asked by Severodvinsk reader V. Yeremenko; first paragraph is Yeremenko's question, second paragraph is source introduction]

[Text] **We have more million of diabetics in our country. And they all need insulin. Is there any substitute for insulin? After all, there's such a shortage of that drug now.**

We asked T. Trumpe, senior research associate of the department of pharmacology at the scientific production association VILR and candidate of biological sciences, to answer that question.

The All-Union Scientific Research Institute of Medicinal Plants spent several years studying the medicinal vegetable crop stachys, which widely found in Eastern countries.

A teaspoon of powder made from the tubercles of that plant can reduce considerably a diabetic's daily need for insulin, and continued ingestion leads not only to a reduction in blood sugar levels, but also to the accumulation of energy reserves in the body that protect the individual from loss of consciousness. According to the studies, stachys is not toxic and has no contraindications. Young leaves brewed like tea lower blood pressure in hypertension.

Stachys is planted in the fall. The agricultural cooperative that specializes in growing it, FITO, will send the planting material to anyone who needs it, C.O.D. An order costs 20 rubles. The price of the order covers stachys tubercles, postal costs, planting instructions, culinary recipes, and advice from a phytotherapist. To place an order, you must write to this address: 607010, Nizhgorodskaya oblast, city of Kulebaki, St. Razin Street, Building 59-a, FITO Agricultural Cooperative.

Joint Production of Medicine by US Firm, Soviet Enterprise

927C0026D Moscow ROSSIYSKAYA GAZETA in Russian 23 Oct 91 p 4

[Article by Victor Romanchin, under the rubric "Fact and Commentary": "Miracle Drug"]

[Text] The situation in the country in terms of drugs for the population is nearly catastrophic. The enterprises that manufacture drugs are in a disastrous way. Their equipment is worn out, their buildings are deteriorating, and the working conditions for those employed in the pharmaceutical industry do not meet any standards. The output of domestic preparations fell to two-thirds of last year's output. The situation is such that practically everyday, some drug disappears. Even the most basic items are nowhere to be found in the pharmacies: mustard plasters, analgin, cough drops. And that on the eve of winter, when, as everyone knows, there is an outbreak of colds.

The situation with the drug supply has even alarmed the RSFSR Supreme Soviet. It looked into the issue and recommended the adoption of a program of emergency measures aimed at stabilizing the situation.

Against the backdrop of empty pharmacy windows, especially heartening are the reports of foreign deliveries and the organization of joint ventures in the manufacture of drugs. For example, thanks to the joint work being done by the American company Searle and the Moscow production association Moskhimfarmpreparaty, a preparation that literally kills ulcers—Cytotec—will appear in Russian pharmacies in the very near future.

"Cytotec was acknowledged to be the best medical preparation of 1988 among U.S. pharmaceuticals," says Vladislav Deygin, RSFSR deputy health minister. "Every year, some 100-120 new drug preparations come to the U.S. pharmacology commission, and only once every three-four years does one of them receive the touted Avon rating—a "5+" in our terms. Cytotec was given that very rating."

In the estimation of the medical profession, Cytotec, in terms of efficacy, is a real miracle drug. Some 90 percent of patients are cured after just one course of treatment. One container of the preparation is sufficient for a four-week course of treatment of a gastric ulcer or a peptic ulcer. In addition, the drug is also valuable for the fact that it not only treats the illness, but also prevents it. What is also important is that the drug will be sold for rubles only.

The appearance of that drug on our barren market will certainly be able to help thousands of people with ulcers. That illness is, unfortunately, rather widespread in our country. We can only hope that the initiative taken by Searle and Moskhimfarmpreparaty will move other well-known foreign firms to undertake similar joint work. As reported to us by the RSFSR Ministry of Health, the Akrikhin plant in Kupavnya, near Moscow, has already begun the manufacture of one of the most advanced cardiovascular preparations—capoten. The large firm Bristol-Myers Squibb is helping to produce the preparation. Preparations are under way for the construction in Moscow of a plant for the production of insulin, the supply of which is disastrously low in this country. An unthinkable number of diabetics are suffering because of that shortage. In Chelyabinsk, plans calls for the manufacture of cardiovascular preparations, particularly cordaron.

So, the ice has been broken. One hopes that the political situation in our country does not affect the supply and production of drugs. The health of our citizens will depend largely on that.

US Charity Offers Aid to Soviet Hospitals

927C0026E Moscow ROSSIYSKAYA GAZETA in Russian 23 Oct 91 p 8

[News item, no byline, under the rubric "The Russian Information Agency Reports": "They're Doing Some Good"]

[Text] The public charity organization Friends of VPA [not further expanded] in the United States, which has, according to its data, a fund of $140 billion, is ready to provide all hospitals in the USSR "life-saving articles"—that is, the most important drugs and equipment—free of charge, with delivery to Soviet airports. The Americans are making two stipulations. First, the USSR government must make an appeal for medical aid. Second, a mechanism must be created to track the aid from the airport to the patient, in order to prevent losses.

The USSR is already a "disaster area." According to official data, we have, at best, 25 percent of the drugs we need. An ordinary famine is nothing next to a drug famine. The Friends of the VPA in the United States is prepared to send, within three weeks after the Soviet side meets the conditions, a professional team that will begin dispensing the humanitarian aid immediately.

Drug Shortage in Vladivostok

927C0026F Moscow MEDITSINSKAYA GAZETA in Russian 23 Aug 91 p 3

[Article by V. Viktorov: "You Can't Afford to Criticize"]

[Text] At the very edge of the Soviet land, the port city of Vladivostok found a place for itself. There's plenty here of what is purely far-eastern exotica. In many other ways, however, the city—and the Maritime Kray as a whole—is experiencing the very same difficulties in everyday life that the other territories of the country are experiencing. The drug shortage, no matter how hard far-easterners have tried to prevent it, has become commonplace here, too. When you run to the pharmacy, it's hard to find any of the pain relievers.

Imported preparations that individuals have become accustomed to are coming into Vladivostok pharmacies in extremely small amounts. It's hard to find analgin, and there's an even worse shortage of complex pain-relieving preparations. The sharp cutback in deliveries of imported preparations this year immediately elevated medicinal agents such as broncholytics, hormonals, antihistamines, coronary agents, and urgent therapy agents to the ranks of scarce preparations.

In addition, the shortage of domestic preparations is also dramatic. Supplies of temperature-lowering agents are limited, and there is a shortage of citramon, theophylline, allohol [allokhol], and activated charcoal.

"Supplies of the most varied of preparations have dropped sharply," says T. Chukantseva, deputy general director of the Farmatsiya production association. "We cannot rely on centralized deliveries alone. To somehow get out of this situation, we are working with local enterprises that have hard currency. For example, the Primorglavsnab association has allocated hard currency for the purchase of insulin. And we ourselves are not sitting on our hands. We've created two small specialized enterprises for growing and processing medicinal plants. We are changing the technology at the galena factory so that we can produce certain preparations ourselves right on the spot.

Our respected reader has probably noted that not a single enterprise that has disrupted deliveries has been named. There are reasons for that: the leaders of the Farmatsiya association are afraid of retaliatory measures from those who are criticized. In fact, there are dozens of examples in which the supplier-enterprises by their own decision are cutting back—come to think of it, even halting—shipments. Some are hinting that it is time, they say, to change over to barter. In a word, when the dictate of the producer reigns, you can't afford to criticize.

Health Ministry to Ensure Provision of Key Medicines

927C0026G Moscow PRAVDA in Russian 20 May 91 2nd ed p 3

[Commentary by T. Kozhoka, board director of the All-Union association Soyuzfarmatsiya, in response to letter by reader A. Bochkarev, from the city of Engels in Saratov Oblast: "Getting Validol With Coupons"; first paragraph is letter; second paragraph is source introduction]

[Text] **I have a bad heart, but the pharmacies don't even have the most basic preparations. What has it all come to? What are our prospects for getting drugs?**

T. Kozhoka, board director of the All-Union association Soyuzfarmatsiya, comments on the letter.

They say that answering a question with a question is a sign of bad behavior. But I'd also like to ask something: who would have expected that a number of chemical and pharmaceutical enterprises would come to a halt because the miners struck and the farmers were waiting for help from the city people?

The economy is a complex organism in which everything is interrelated. The shutdowns in the coal-tar chemical industry virtually paralyzed the manufacture of a hundred drugs. The disruptions in deliveries of soda ash and benzyl chloride resulted in a lack of pharmacy vessels and packing materials. And here's the result: if, going into 1991, we figured to receive 34 percent of our drugs from domestic industry and the rest from purchases abroad, then now all the calculations are crossed out. Domestic plants and factories are running a fever, and foreign deliveries have been disrupted because contract deliveries of 1990 still haven't been paid for—we don't have any hard currency.

And now about the prospects. The country's Ministry of Health has approved 313 drugs that absolutely must be in hospitals, medical stations, and pharmacies. Their manufacture is expected to be resumed by domestic enterprises, and what's in short supply will be bought abroad. But the Union and republic governments must decide once and for all who is laying out the hard currency.

And something else. The pharmaceutical industry needs raw materials. But who is going to do the gathering and the procuring if the price lists haven't changed for years in the pharmacy system, and drugs of animal and plant origin cost copecks? Of course, that's the way it has to be, but their production costs are too high! Who on earth is going to pay for the sector's losses? Who is going to save it in the market whirlpool?

The USSR Ministry of Health has put those and a whole array of other problems out for examination by the country's Cabinet of Ministers. If those problems aren't solved, I'm afraid, we will have to introduce coupons. Just imagine a coupon for validol. Personally, I can't.

Pharmaceutical Enterprises Reluctant to Relinquish 'Monopoly'

927C0027A Moscow MEDITSINSKAYA GAZETA in Russian 9 Aug 91 p 7

[Article by Ye. Andruskiy, Kazan, under the rubric "Man and the Market": "A Vested Interest in the Shortage"; first paragraph is source introduction]

[Text] **Recently, in Kazan, vegetable stores began selling medicinal plants. Last year, the Chernyshevskiy sovkhoz alone sold a ton of origanum, almost two tons of balm, and nearly six tons of peppermint. This summer, along with tomatoes, housewives are buying calendula at the vegetable stores, and on the sidewalk you can find leuzea and golden root.**

Maybe the pharmacies are overstocked? I certainly hope not, because there's nothing anywhere to be found in the pharmacies. The overall shortage has emptied their counters to such an extent that asking about a drug is awkward, and you already know the answer anyway: No, and we don't know when we will have it.

You have to hear how that grandiose phrase is enunciated. With dignity, and even pride. And the reason is simple to the point of absurdity. Many of those who work in the pharmacy monopoly have long been using their position to make small-scale barter deals. I give you a scarce drug, you give me a scarce commodity or service. If you can't come up with a counter offer or there's nothing for you to offer, just wait for when the old surpluses are thrown out for general buy-up. Isn't that why it's so hard to entice druggists over to some other kind of work? After all, access to scarce drugs not only helps compensate for their miserly wages, but also feeds their sense of importance. Isn't that why the pharmacies are empty today?

I understand that there are also so-called justifiable reasons—stoppages in operation of pharmaceutical plants, the fickleness of subcontractors—but it's not just the point men who have a vested interest in the shortage.

As an entrepreneur, I also have an interest in the shortage. But not in a shortage with such a distorted form, one that dispossesses the everyday consumer of goods. My interest is in the shortage as a signal to action that presumes the elimination of the shortage.

The company Posrednik, which I head, takes up the slack for the shortage of public services in manual therapy, vertebroneurology, and acupuncture. Thanks to the company, people can make use of the help provided by specialists whose services are virtually impossible to get through the ordinary channels. At this very moment, we are prepared to sell sea buckthorn oil, herbs, and mumiyo [Russian word for a tarlike substance used in folk medicine]. Our potential customers are clearly pleased by medicinal-cosmetic cremes that we are preparing industrially for production at the request of the Kazan production association Tatkhimfarmpreparaty. We are capable of setting up very quickly the production of mustard plasters, which have long been among the ranks of extremely scarce items.

So what's the problem? you ask. Just go do it.

But it's not happening because the pharmacy department does not want to forego its monopoly. Presuming the need for menacing instructions and orders that are meant to keep just anyone from engaging in the sale of herbs and medicinal preparations, we are ready to work under the supervision of the pharmacies. And their people are not at all against working with us. For the right fee, of course. And they're willing to share their areas—they don't have anything to sell anyway. But the general director of the Tatar production association Farmatsiya, M. Anisimova—to whom we went with the request that she supervise our work—politely, but firmly refused.

The hidden reason behind the refusal is completely clear to us, but what we are usually told is that the prices at which we intend to sell the medicines are unacceptable.

Yes, we will sell them at prices that are somewhat different from those at which the government sells them. But judge for yourselves what is better: cheap, with nothing available, or expensive, with a surplus?

We have to face the truth: the entrepreneur aims to make a profit. The government thinks primarily about the needs of the consumer and only then bashfully plans a profit. But while the government is still just thinking about it all, the entrepreneur, in pursuit of profit, eliminates the shortage. Money, which everyone regards so jealously, is what he needs to develop his business. His benefit and the consumer's interest make up a dialectical whole—one is simply unthinkable without the other.

And speculation is not mentioned, but it is implied. And what, in our society, that phenomenon is actually regarded as something negative. But it's one thing to acquire a scarce commodity from some base through a friend and "push" it at some exhorbitant price, and another to go to the ends of the Earth to get some commodity and then sell it and be honest enough to pay the taxes on it. The rest of the world has been engaged in that kind of "speculation" since olden days, but in our country, it's the prerogative of the state.

Many absurdities are justified by the state's interests. The Kazan pharmacies, for example, refused to sell the mumiyo that we were ready to deliver to them in large quantities. The mumiyo, you see, is not standardized. Well

then, let's do the necessary studies and make it fit the GOST requirements. And we would get the money for the studies by selling mumiyo abroad. But we can't, because mumiyo has precious raw material status. Is that a mockery of common sense, or what!?

The most ridiculous thing is that while the pharmacy department, like a dog on hay, won't let those who need mumiyo get near it, it's being sold in the open-air markets of the country in nonstandardized form and at very high prices. And no one can guarantee that instead of getting mumiyo the buyers aren't being slipped a mixture of tar and goat dung.

And we are selling mumiyo, as long as there is a demand for it. But securing a certificate of quality signed by specialists whom, forgive me for saying so, you can't trick with goat dung. Moreover, with our still modest budget, we are financing studies that are being conducted bythe UzSSR Ministry of Health Endocrinology Institute on the mechanism underlying the effect of mumiyo on the human body. Does that mean one can have something to do with us?

Valuing our company's reputation, we simply cannot allow bad product to get through.

For the time being, we are seeking possibilities for collaboration, and, in light of the Farmatsiya monopoly, even if it's not on a partner basis. The day of the market will arrive, and Farmatsiya itself will seek to have ties with us and will even make concessions that are unthinkable today. Widespread privatization of pharmacies is inevitable, as is the creation of cooperative and joint ventures based on them. Only in that way will we be able to meet the demand for drugs in the coming market economics. But today, the Farmatsiya leadership, with a professional arrogance, is still watching the clumsy attempts of Agroprom to compete with it and is, in a disgusting manner, ignoring the products of entrepreneurs who want to make a profit on "some of the weaknesses" in our economy.

But people, in the meantime, are getting used to going to hardware stores for bischofite and to vegetable stores for calendula and ordering sea buckthorn oil from us.

Editor's note: We do not share all the positions taken by the writer, especially those about the advisability of selling herbs and mumiyo in vegetable stores and certainly not in hardware stores. In addition, the newspaper stands firm on its own position that mumiyo should be standardized.

Signing of International Convention to Affect Pharmaceuticals Industry

927C0027B Moscow IZVESTIYA in Russian 19 Oct 91 p 5

[Article by Ye. Manucharova, special correspondent for IZVESTIYA: "There Aren't Any Drugs Now. And Will There Be None Later?]

[Text] I wouldn't surprise anybody if I said that our pharmacies don't even have the basic necessities, that not only can you not find imported drugs, but you also can't find the usual Soviet-made drugs. And it wouldn't be worth saying again that there's a painful shortage. It wouldn't be worth saying, except for this: we could lose the opportunity and the right to create even those last drugs. The fact is that in most of the preparations, we are plagiaristically and without proper licences duplicating the compositions that have been found by foreign firms. Our pharmacologists are acting against the interests of other countries and are doing so absolutely illegally.

The law was not a law for us because the country set itself apart from the international convention for the pharmaceutical industry because the convention required too much of the drug manufacturers. The world community required that each preparation have a certificate that assures its complete safety and indicates that the drug was created with special GLP (good laboratory procedures) equipment. That's how the world market protects the consumer.

Now those regulations have become mandatory for our pharmaceutical industry, too, because a document was recently signed that brings us intot the convention.

But what can we do? What kinds of certificates do we have? I'm on my way to the All-Union Science Center for the Safety of Biologically Active Substances [BIANTs], in the small Staraya Kupavna, near Noginsk.

The closer we get, the harder it is to breathe, even in the car. The pungent smell is typical. Drug production always has an aggressive effect on the environment. And in Kupavna, that's not all there is. Worse than that, BIANTs, that center for delicate pharmacology, is located in the sanitary zone of the large Akrikhin pharmaceutical plant.

Have you ever noticed? In enterprises, there are usually water dispensers around—sometimes with boiled water, other times with water that hasn't been boiled, although it, too, is for drinking. There aren't any in BIANTs. Of course not—the water in Kupavna is polluted by the drug production. But then, for chemists there's no bigger problem in preparing distilled water for themselves. That's understandable. And so is the fact that Moscovites (they are the ones who work in BIANTs) bring thermoses with tea from home when they come to work.

But will there really be enough carted-in water for all the laboratory work? The best vivarium in the country is here, but how on earth can you keep things right for the multitude (thousands!) of laboratory animals on whom they test a preparation to see if it is safe or not? You can't. They swallow the water that's there, breathe the air that comes in from Akrikhin. It poisons them, of course. Not enough that it's noticeable outwardly. But enough that you can forget about the GLP requirements. The energetic work done by Prof Yu. Burov, the director of BIANTs, in creating purifier structures for the water and filters for the air might improve the situation. But only a little.

I'm aware that everything that has been written greatly offends today's high officials at BIANTs. After all, the situation that has come about there is not their fault, just their misfortune. They came into management when the old technologies in Kupavna were already in operation, and Kupavna became the embodiment of an amazing paradox: products created to heal people are undermining their health. The people have long known that.

But here's some unexpected information. And it's the latest. In the opinion of the upper echelons, the source of all the problems of the pharmacies is in the protests of the people against chemical plants. As if in other countries (where the pharmacy shelves are bending under the weight of the variety of preparations!), the people have agreed to put up with enterprises that have harmful effects.

We should be trying to find reasons for the global shortage in the public's mood. The reasons are deeper than that. The incentives to produce have been wrested away from the pharmaceutical industry workers themselves: they've been driven into a corner. The fact of the matter is not only that the laboratories and plants don't have the equipment (GLP) that could raise us up to the level of the international market. Equipment and reagents are needed by the pharmacologist. But they're not at all enough. They are only the means. What's lost is bigger—the end.

That was discussed at the just recently held All-Union Science Conference on New Medicinal Agents. It was a gathering of scientists from the USSR Academy of Sciences and the Academy of Medical Sciences, officials from finance and management organizations, and managers of new economic structures. The two-day meeting didn't solve anything, nor could it have. After all, the work principles themselves of the pharmacologists have to be changed.

Abroad, an individual who creates a good, new medicinal preparation can rest assured that if it is widely used, he will be set for life. He will get status, and respect, and a lot of money. But with us, that individual just keeps getting his salary wage.

How can that be? Prof A. Kamarnitskiy said at the conference that in his academy laboratory, where fundamentally new drugs are created, salaries are only two-thirds of the standard. And that with research associates getting a salary of 250 rubles a month. That's the actual budget of the basic science that generates original ideas for new drugs.

Ideas are the capital we can use for commerce, according to the bravest of pharmacologists. The West has nothing against that. Neither does Japan. But they and others are suggesting to us yet another solution. They are suggesting it and executing it.

The Americans have built two new plants in our country. One makes vitamins. The other makes substances used in the manufacture of drugs—certain kinds of intermediate products. It is those very kinds of works (even with the most advanced technology) that the people of developed countries don't want on their land. That's why such large-scale pharmaceutical industries are in India. They're plants that are joint ventures with the West.

Now similar agreements are being proposed to our pharmacologists more and more often: the substances used to make the drugs will be produced in our country, and the final (clean) stages for the creation of the preparation itself the foreign firm will do in its country—where there's GLP.

In the long term, that's not beneficial, but it serves the short-term interests of the plants and research institutes. Our pharmaceutical organizers understand that they not the winners for the time being. Even now it's clear now that ideas generated in BIANTs are being intercepted and embodied in the very drugs that are on the shelves of foreign pharmacies and are making the foreign partners rich.

But why not ignore the short term? Why not tighten our belts, buy the necessary equipment, set up vivaria that are outlandishly expensive but just as remarkable as those in the West, and put everything together (plant, applied science, basic research) in large scientific production associations? Let's say a complex of Akrikhin plus BIANTs? And they would work together.

Scientists have tried to effect that simple idea. At Akrikhin they feel that the plant could even maintain several large research institutes with its profits. But! The plant is left with a pitifully small amount of what it earns. All the rest must go to the state. The system of exhorbitant taxes extends to the developers of drugs: both to the plant and to the research institute (even though it is a budgeted organization). In return, a joint venture lives in the first few years without taxes. It's beneficial to join up with one: our scientists with the applied people from abroad, our applied people with foreign scientists.

The pharmacists can't rely on help from the upper echelons. Centralized financing is becoming less and less dependable, because the pharmaceutical industry is decentralizing. And pharmacists should know this: right now none of our leaders (who are engaged in a political struggle) are having anything to do with medical preparations. "No one is ordering drugs, no one is forming a strategy. The pharmaceutical committee is capable of only what was done in olden times: send down a list of 'guidelines' that would best be used to synthesize drugs. But after all, you don't have to be a great pharmacist to determine that, yes, it would be good to have some sort of drugs against cancer, infarcts, and AIDS."

And nothing is changing with the years. And not the Chernobyl accident or the reports of massive contamination of people in the Urals or the reports of the outbreaks of cholera under study had any effect whatsoever on the lists from the pharmaceutical committee.

To our great dismay, it must be admitted that perestroyka has simply been harmful where it has been specifically applied (health care, for example). It has increased the indifference of the upper echelons and brought chaos to the lower echelons. But then you could look at it from another angle. Now it's clearer than clear that the leaders of the health ministries (Union and Russian republic) do not know themselves what to do or what they can be guided by. But if that's so, then why do we need them at all?

At the well-attended meeting on drugs, all the attempts of the pharmacologists to send out an SOS, to tell the leaders that it's time to rescue domestic pharmacology, sank to the bottom in the leading discourses.

But it would seem to be the time to understand that things are bad. And the government (Russian, Union—any government, it doesn't matter) must quickly turn to pharmacy. After all, there's virtually nothing there; it's about to start

on the road to independence. The world will no longer allow it to engage in plagiarism. And the purchase of imports will cost the country more than "advances" for the pharmaceutical industry itself. Especially since we are gaining not only a pass into civilization, but also the health of our people, and that means the very life of the country.

Academy of Medical Sciences President on Public Health

927C0028 Moscow TRUD in Russian 3 Oct 91 p 4

[Interview of Prof Valentin Ivanovich Pokrovskiy, president of the USSR Academy of Medical Sciences, by N. Gogol: "Our Medicine Is Still Alive, But It's Seriously Ill"; first paragraph is source introduction]

[Text] **Prof V. Pokrovskiy, president of the USSR Academy of Medical Sciences, answers questions put to him by a TRUD correspondent.**

Gogol: Valentin Ivanovich, it's been a long time since we've heard anything about the achievements of our medical sciences.

Pokrovskiy: You mean, somebody's actually interested in that?

Gogol: I understand your sense of irony, especially since, with all the global political events, many important aspects of life have actually disappeared from the public's field of vision. But interest in the medical sector is still there. I mean, our readers are asking whether medical science is still alive, or whether all that's left are "psychotherapists," psychics, and sorcerers.

Pokrovskiy: In theory, nothing unusual is happening, and in times of "great discord," there have always appeared an incredible number of sorcerers, miracle-workers, and the like. It's not good that some of your colleagues are plodding so willingly through all this froth, with no desire whatsoever to sort things, to figure out just what in fact is happening in medicine, whether it's classical medicine or folk medicine. What's true, and what's false? Where there's help available, and where it's clearly charlatanry?

People are of the opinion that our science is the very worst, that everything is bad in medicine. That has, to a large extent, knocked the desire out of the scientists to educate people about their achievements, which, in absolute fact, do exist.

Take, for example, radiosurgery. Unique procedures make it possible to perform complex operations on vessels of the heart and the brain without any incisions—thrombi are removed, narrowings are expanded, blood vessels are drained. Specialists from all over the world go to the Center for Surgery to Professor Rabin, who heads that area. They come to us to learn!

Here's another example. The Vishnevskiy Institute of Surgery teaches people how to make skin substitutes. First they grow a tissue culture, and then they transplant it onto burn victims. Thousands of victims have been given a chance to survive and get well.

There's a lot that could be said about the achievements that exist in laser surgery, neurosurgery, and epidemiology....The intellectual potential of our science centers is not inferior to that of foreign centers. The problems come up at the stage of implementation of the ideas....

Gogol: That's reminiscent of one of our scientists, who noted that Soviet science has long and steadily been working with all its potential for the West. The implication here, of course, is not criminal, but economic: we're often not in a position to implement our own scientific-technical developments—we don't have the technologies or the production capabilities. And the result is vexing. Recently, I was present at a demonstration operation for the removal of the gall bladder performed by American physicians. The operation is virtually bloodless, unique instruments are inserted through a small incision, and the patient can be discharged from the hospital after only three days. We thanked the Americans for their virtuosity, and they thanked us for the instruments, which, as it turns out, were designed in the Soviet Union. And now they are proposing that we buy them for hard currency.

Pokrovskiy: That situation, unfortunately, is typical. That which is valued highest throughout the world—new ideas, intellectual products—has, in fact, lost its value with us, because they often cannot be put into practice.

Today, for example, we are faced with the need to buy a large stock of drugs abroad, or else face disaster—the pharmacies are empty, and the hospitals are also in bad straits with drugs. So you ask, Are you saying that our medical science is incapable of providing such needed preparations? Well, it is, in fact, capable, and it is providing them. But... Somewhere on the way to the patient, those preparations are running into enormous—at times insurmountable—barriers.

Let's start with the fact that the overwhelming majority of our institutes—with the exception of superclinics like the All-Union Cardiology Center and the Interbranch Science and Technology Complex Mikrokhirurgiya glaza [Eye Microsurgery]—don't have an experimental production base. And without that, turning out the necessary quantity of medicinal drugs that need testing is simply impossible.

But let's assume that somehow we managed to solve that problem. The next step involves preclinical testing, and that's a total flop. The terrible upkeep of the experimental animals and the poor food they get—in particular, there's no sterile food—make it impossible to get a reliable idea of the quality of a new drug....Quite recently, it seemed that we had almost overcome that obstacle: 15 million rubles were invested in the construction of a modern vivarium, and just a little is left to complete the facility, but they won't give us any more money. It's like, to save a million, they're ready to give up 15 million, when the most important thing has to do with the prospects for the development of some solid science collectives.

Gogol: It's no secret that we're helping the West not only with ideas, but also with highly skilled personnel. Just how can we stop the "brain drain"?

Pokrovskiy: First of all, we shouldn't provide the incentive for it. A trolley bus driver gets a salary that is three times that of a totally mature scientist. That crushes the prestige associated with his labor. Thoroughly. A specialist who is contracted to go to the United States—I emphasize, who goes out on a contract, and does not get a permanent job—gets roughly $25,000-30,000 a year (for America, that's a pretty modest figure). But over here, when the specialist's salary is figured in hard currency, he makes less than $100 a year.

It's not just money that draws people abroad, it's also the opportunity to work on a state-of-the-art level of science, with the latest equipment, and reagents available, and so forth. For a serious scientist, that is, perhaps, of primary importance. But over here, he spends a great deal of time looking for the right preparations and the right reagents and repairing equipment.

Medical science today has very slim financing. For example, keeping the equipment of the USSR Academy of Medical Sciences institutes in good working condition takes roughly 20-25 million nonconvertible rubles a year. But we only get 3 million rubles. Expensive systems are standing idle because we don't have a few thousand rubles to buy a spare part. Science suffers, and scientists lose their opportunities, because they not in a position to realize their potential to the fullest.

We feel that the blossoms of science are leaving. They're people between the ages of 35 and 45, people who are in the prime of their creative life. They're not just going abroad—those are by no means a majority. Many are leaving for cooperatives. They get paid better there, but there's no science. Some are going into practical health carer—after all, doctors today receive more than do researchers.

Medical science, in general, enjoys a rather strange relationship. Since the very first days of its existence, the USSR Academy of Medical Sciences used to be tied to the USSR Ministry of Health. The financing came through the ministry. Bureaucrats, and not scientists, decided the fate of collectives working in research areas. It's not surprising that a patronage system flourished: the "eminent" individuals had everything they needed, and even more, while the rest dragged about in a miserable existence.

We decided to scrap that system. We introduced the commission of experts in research. The use of a specially created fund—a fairly large one—made it possible to provide incentives to areas that, in the opinion of independent experts, held the greatest promise. Human genome research, for example, and other work. We managed to prove to both the Union government and even the USSR Ministry of Health that the complete independence of the Academy—organizational and financial—benefits everyone. But today, we are faced with the fact that all our institutes in Russia are being subordinated to the RSFSR Ministry of Health. We're almost right back where we started—departmental dictatorship!

Gogol: I've had the opportunity to be in contact with physicians and scientists from the former Union republics, and many complain that until very recently, funds from the entire country went into one pocket, and those funds were used to build modern research and treatment centers in the capital and in other cities of the RSFSR, and now the republics have to pay to sent their own patients to Russia. Is that fair?

Pokrovskiy: I am convinced that any voluntaristic decisions will lead to nothing good. We will just aggravate what is already a terrible situation for medical science, we will break traditional ties, we will create unnecessary conflicts between republics.

Gogol: More and more often, there are outbreaks of cholera and typhus here and there, and even cases of the plague. Are there more incidents of infection, or did we simply keep quiet about them before?

Pokrovskiy: We kept quiet about them. Of course, a small circle of individuals knew about it all, but such information didn't make it to the newspapers. There have always been outbreaks and epidemics. The secretiveness is a tough joke. Here we've had complete glasnost for more than five years now, but the seal of secrecy was removed only very recently from data on plague morbidity. When you page through those yellowed documents, it becomes clear that we've been blindfolded for decades.

Gogol: What's our situation with AIDS?

Pokrovskiy: Happily, things are more or less okay. Some 700 HIV-infected individuals have been identified, plus about 70 with AIDS. For a country as large as ours, of course, that's nothing. In addition, it's an example that proves convincingly that timely, widely implemented measures make it possible to handle extremely complex problems that many countries can't handle (they were effected thanks to a consolidated state epidemic-control service). Of course, the dissemination of medical information has also worked. People who have a promiscuous lifestyle hav e become more careful. But it's too soon to feel secure. Aids is like the sword of Damocles hanging over us. I fear that in the near future morbidity amogn male homosexuals will take off. Like before, identifying them will be very difficult: the problem is the laws that are driving homosexuals underground. We still don't have any reliable statistics on them.

Gogol: It's not clear yet whether we will go hungry or not this winter, but it's a fact that the people will be fortifying their bodies with an unbalance diet because of the barrenness of the product counters. What can medical science do to help in that regard?

Pokrovskiy: You can't eat recommendations, of course, but even in today's situation you can use them to feed yourself more sensibly. As paradoxical as it sounds, a substantial segment of the population is, as before, overeating. Very often, especially in the cities, the diet is not balanced: too much albuminous-fatty food is consumed, and not enough carbohydrates, vitamins, or trace elements.

Of course, all that depends not only on the individual, but also on the choice placed before him. It's no secret that we

are already being forced today to buy many products abroad. But what's the underlying principle of the purchases? Expensive butter is being purchased in enormous batches, whereas the entire world has long preferred various types of margarine, which tastes as good as butter, but is immeasureably better for the individual because it contains vegetable oils. And such examples are legion. Why aren't they going to the scientists and listening to their opinion on the matter?

Gogol: There are a lot of conversations about the refusal of academicians Ye. Chazov and N. Vereshchagin to examine M. Gorbachev when he was incarcerated in Foros. Accusations are being leveled at the scientists.

Pokrovskiy: I think they behaved absolutely correctly. A decision to make an official examination of any individual can be issued by the courts only. There can be a consultation, but not an examination—those are two different things. And there's this. There exists a definite protocol when it comes to examining people of that rank. There has to be a council. The decision to make such an examination isn't made by the RSFSR health minister, and certainly not the RSFSR deputy health minister, as it was in that case, but by chief of the treatment-recovery association in the USSR Cabinet of Ministers. Such a decision was not made.

Gogol: I think our readers would be disappointed if we ended the conversation without returning to a question that was only lightly touched upon at the very beginning of the conversation. In fact, people are dazzled by the enormous number of psychics and sorcerers who have the ability to "treat any illness." How are we, mere mortals, supposed to regard that?

Pokrovskiy: My advice is to regard it with a dose of healthy skepticism. I feel certain that ultimately everything will get back to normal and we will cease being the object of ridicule of foreigners who marvel at how all that devilry can flourish so wildly in such an educated country. Especially since it's not so harmless. There is, for example, one popular doctor who "charges" water. Bypassing us, scientists, he decided to try his method on AIDS victims. As a result, we lost two patients: one death was that of a child whose mother believed in that "special water" and refused to use antibiotics. Our very first AIDS patient, Volodya, also died: after a month of "treatment" with the "charged" water, his immune status dropped to zero, and it couldn't be raised back up.

Or how about this. They show a woman on TV who walks around a market with a twig and determines the nitrate content in fruits and vegetables. Well, I can maybe accept that somehow. But then it's explained that she can also remove the nitrates! That is, one of the fundamental laws of physics about the conservations of energy and mass—all of a sudden means nothing! What stupidity.

Yes, there are people with unusual talents and abilities, and there's the many centuries of experience garnered by folk medicine. All of it has to be studied and used for the good of people. In the final analysis, all of modern medicine has come out of folk medicine. Valerian and lily-of-the-valley drops—they came from folk medicine. We can't be disrespectful of the sources of our knowledge.

I would appeal to the practice of our Eastern colleagues. In China and Korea, there are scientific and higher educational institutions that study the experience of folk medicine, which is also referred to as traditional medicine, and they have their own polyclinics and pharmacies. But then there's no mysticism there, and everything is based on physiological patterns and a thorough knowledge of the human body. Who today would dare reject acupuncture, breathing techniques, special exercises? Nobody, that's who! Because it's all serious.

Recently, at the Moscow Medical Academy, the Institute for Traditional Medicine and Treatment Techniques was set up, and I hope it provides an opportunity for folk medicine to occupy a deserving place in our lives. We are ready to help it. It would benefit people.

Aflatoxin Contamination of Milk and Dairy Products in Southeastern Kazakhstan

927C0194B Moscow VOPROSY PITANIYA in Russian No 5, Sep-Oct 91 pp 72-74

[Article by P.S. Nikov, A.S. Bukharbayeva, A.M. Baimbetova and N.T. Amireyeva, Institute of Regional Nutrition Problems of the USSR Academy of Medical Sciences, Alma-Ata]

UDC 614-31:637.1:615.918:582.28](574)

[Text] The question as to the possibility of contaminating milk and dairy products with aflatoxins and their producers is being discussed rather extensively in the scientific literature, especially foreign [5,6,8-10,12,16,17]. According to different data the frequency of contamination of these products by aflatoxin M_1 varies from 1-2 to 50 percent, while the level of contamination is from several nanograms to 250 μg/liter (kg). Extremely little research has been conducted on the possibility of contamination of milk, dairy products and baby formula in the USSR. According to the first observations made in the laboratory of sanitary and dietary mycology of the Institute of Regional Problems of Nutrition of the USSR Academy of Medical Sciences [4], conditions favoring contamination of the indicated products by aflatoxins B_1 and G_1, including at concentrations exceeding maximum permissible, exist in southern Kazakhstan. However, this problem requires further systematic research, the results of which could serve as grounds for purposeful planning of preventive public health measures.

The goal of this paper is to study the degree of contamination of milk, dairy products and baby formula by aflatoxins in southeastern Kazakhstan.

Tests were made on 395 samples of dairy products (whole milk, powdered milk, melted butter, melted cheeses, and the baby formulas "Malysh," "Malyutka," "Vitalakt," "Detolakt," "Molochnaya Smes"), taken from the trade network and dairies of Alma-Ata, in compliance with the

requirements of the appropriate all-union state standards. Aflatoxins were detected in the products by thin-layer chromatography [1,2], and a quantitative estimate was made by scanning the thin-layer chromatography plates with a Hitachi 650-60 spectrofluorometer.

The results of analyzing contamination of products by aflatoxins are presented in the table. Out of 395 samples of dairy products and baby formulas we studied, 15.6 percent were contaminated by aflatoxins. Aflatoxin B_1 was determined to be the most frequent contaminant, while aflatoxin B_1 was detected more rarely in combination with aflatoxin G_1, and in three cases (powdered milk) with aflatoxin M_1. Aflatoxin G_1 was never detected alone in any sample. Samples contaminated by aflatoxins were found among all studied types of products except whole milk and "Molochnaya Smes" baby formula.

Frequency and Degree of Contamination of Milk and Dairy Products by Aflatoxins

Product	Number of Samples Analyzed		Level of Contamination by Aflatoxins, g/kg		
	Total	Contaminated	B_1	$B_1 + G_1$	M_1
Milk, whole	41	-	-	-	-
Milk, powdered	119	21(17.6)	0.1-0.8	0.75 +1.3	0.2
			11.0	2.5 +1.5	0.35
					0.4
Cheese, melted	63	5(7.9)	6.3-12.8	6.3 +1.0	-
				7.14 +5.6	
Butter, melted	45	13(28.89)	0.1-0.8	-	-
Baby formulas:					
"Malysh"	52	13(25.0)	0.1-0.8	12.5 +1.8	-
			14.1-18.0		
"Malyutka"	31	7(22.6)	0.2-0.8	-	-
			6.96		
"Vitalakt"	7	2(28.57)	0.8;0.8	-	-
"Detolakt"	25	1(4.0)	-	5.4 +5.8	-
"Molochnaya Smes"	12	-	-	-	-
Total	395	62(15.6)	53(85.4)	6(9.7)	3(4.8)

Note: Percentages are shown in parentheses.

The level of contamination of dairy product samples by aflatoxin B_1 varied from 0.1 to 12.8 μg/kg, aflatoxin G_1 contamination varied from 1.0 to 5.6 μg/kg, and contamination by aflatoxin M_1 varied from 0.2 to 0.4 μg/kg. The total concentration of aflatoxins ($B_1 + G_1$) in these products was determined within a range of 1.8-12.7 μg/kg. In this case the level of aflatoxin B_1 was above the maximum permissible concentration (5 μg/kg) in 5 out of 39 contaminated samples of dairy products.

In baby formulas the concentration of aflatoxin B_1 varied within 0.1-18 μg/kg, while aflatoxin G_1 varied within 1.8- 5.8 μg/kg. The total concentration of aflatoxins ($B_1 + G_1$) was 11.2-14.3 μg/kg. It should be added that in 6 out of 23 of the contaminated samples of baby formulas, the level of aflatoxin B_1 exceeded the maximum permissible concentration (1 μg/kg).

Because aflatoxins B_1 and G_1 were detected as the principal contaminants, it may be hypothesized that this is the consequence of infection of the indicated dairy products and baby formulas by an aflatoxogenic strain of *A. flavus*. This may be explained by substandard production, transportation and storage of the indicated products, and by the failure to market them promptly. In particular powdered milk was stored in unsealed packaging, and temperature and air humidity requirements were violated to a significant extent. The same violations are rather often committed during storage of baby formulas in the trade network from several months to 10 months. It stands to reason that the possibility of contamination of baby formula cannot be excluded in a number of cases, especially when it contains cereal components and some oils (corn, coconut) owing to contamination of the raw material. Isolated cases of detection of aflatoxin M_1 are obviously associated with the feeding of aflatoxin-contaminated feed to dairy cattle, although according to published data [3,7,11,13-15] this mycotoxin may be not only a biotransformation product of aflatoxin B_1 in the animal body, but also a consequence of its synthesis by the fungus *A. flavus* in dietary, including plant, substrates.

Our data on contamination of dairy products and baby formula by aflatoxins indicate that such products present a serious danger to the health of the population of southeastern Kazakhstan and other regions of the country supplied by it. Preventive public health surveillance must be intensified during production, transportation and storage of the indicated products.

Bibliography

1. Sharmanov, T. Sh. et al., "Metodicheskiye rekomendatsii po kolichestvennomu kontrolyu za soderzhaniyem aflatoksinov v produktakh zhivotnogo proiskhozhdeniya" [Methodological Recommendations on Quantitative Control of Aflatoxin Concentration in Products of Animal Origin], Moscow, 1985.

2. Tutelyan, V. A. et al., "Metodicheskiye rekomendatsii po obnaruzheniyu, identifikatsii i opredeleniyu soderzhaniya aflatoksinov v pishchevykh produktakh" [Methodological Recommendations on Detecting, Identifying and Determining the Concentration of Aflatoxins in Dietary Products], Moscow, 1981.

3. Tutelyan, V. A. and Kravchenko, L. V., "Mikotoksiny" [Mycotoxins], Moscow, 1985, p 27.

4. Sharmanov, T. Sh., Nikov, P. S., Bukharbayeva, A. S. et al., VOPR. PITANIYA, No 4, 1984, p 7.

5. Gelosa, L., LATTE, Vol 1, No 3, 1986, p 261.

6. Huschen, W., Bluthgen, A., Tolle, A. and Engel, G., MILCHWOSSENSCHAFT, Vol 36, No 1, 1981, p 1.

7. Hsieh, D. P. H., Beltran, L. M., Fukayama, M. Y. et al., J. ASS. OFF. ANALYT. CHEM., Vol 69, No 3, 1986, pp 510-512.

8. Kaya, S., ANKARA UNIV. VET. FAK. DERG., Vol 29, No 3-4, 1982, p 443.

9. Micco, C., Miraglia, M. and Onori, R., RIV. SOC. ITAL. SU. ALIM., Vol 15, No 4, 1986, p 249.

10. Moffeo, G., Gavozzi, L., Ferrori, G. and Bianchi, L., ARCH. VET. ITAL., Vol 31, Suppl. 2, 1980, p 34.

11. Nashijima, M., DEVELOP. FOOD SCI., Vol 7, 1984, pp 172-181.

12. Pfleger, R. and Brandi, E., WIEN. TIERARZTL. MSCHR., Vol 67, No 3, 1980, p 101.

13. Ruprich, I. and Piscac, A., VET. MED. (PRAGUE), Vol 30, No 4, 1985, pp 239-246.

14. Saito, K., Nishijima, M., Iasuda, K. et al., SHOKUNIN EISEGAKU ZASSHI, Vol 25, No 3, 1984, pp 241-245.

15. Schidt, F. R. and Esser, K., PROCESS BIOCHEM., Vol 20, 1985, pp 167- 174.

16. Seferin, M. J. L. and Salas, M. I., REV. SAUDE PUBL., Vol 20, No 4, 1986, p 303.

17. Suzangar, M. and Barnett, R., ZESZ. PROBL. POSTEP. NAUK ROLU., No 189, 1977, p 35.

Availability of Medical Personnel to the Population of the Kazakh SSR

927C0196A Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 8, Aug 91 pp 3-6

[Article by M.K. Kulzhanov, G.S. Sabyrov and Z.Kh. Khasenova, Scientific Research Institute of Hygiene and Occupational Diseases of the Kazakh SSR Ministry of Health, and the Republic Bureau of Medical Statistics of the Kazakh SSR Ministry of Health]

UDC 614.23/.25.007(574)

[Text] Publications of recent years pertaining to the problems of organizing public health have reported with increasingly greater frequency that extensive processes are now a past stage in the sector's development and that a transition is being made to new intensive methods of action. Without rejecting the need for intensive use of public health resources, we will examine certain aspects of quantitative support, which from our point of view continue to be extremely important to the republic. The availability of medical personnel to the population is one such problem in the public health of today's Kazakhstan.

The availability of physicians to the population of the Kazakh SSR in 1989, including dentists, was 40.9 per 10,000 population (the average union indicator for 1989 was 44.4). The availability of secondary medical personnel in the same period was 121.6 (the average union indicator was 117.7) (Table 1).

Table 1. Availability of Physicians and Secondary Medical Personnel to the Population of the Kazakh SSR in 1989 (per 10,000 population) in the Ministry of Health System

Oblast	Availability of Physicians		Availability of Secondary Medical Personnel	
	Urban-Type Settlements and Rural Locales	Rural Administrative Rayons	Urban-Type Settlements and Rural Locales	Rural Administrative Rayons
Kazakh SSR	36.4	19.2	103.8	80.9
Aktyubinsk	40.6	22.1	93.6	75.1
Alma-Ata	27.0	21.2	88.5	80.2
East Kazakhstan	32.8	19.9	112.9	74.6
Guryev	34.6	22.2	94.9	86.5
Dzhambul	26.7	14.6	92.8	69.8
Dzhezkazgan	37.9	20.1	126.5	83.6
Karaganda	48.4	17.3	120.5	70.7
Kzyl-Orda	32.2	19.9	132.1	103.5
Kokchetav	28.7	20.5	102.2	91.5
Kustanay	29.5	18.3	102.6	90.5
Pavlodar	33.6	17.7	109.9	86.5

Table 1. Availability of Physicians and Secondary Medical Personnel to the Population of the Kazakh SSR in 1989 (per 10,000 population) in the Ministry of Health System (Continued)

Oblast	Availability of Physicians		Availability of Secondary Medical Personnel	
	Urban-Type Settlements and Rural Locales	Rural Administrative Rayons	Urban-Type Settlements and Rural Locales	Rural Administrative Rayons
North Kazakhstan	30.9	18.3	92.6	70.9
Semipalatinsk	43.0	20.0	100.6	58.5
Taldy-Kurgan	28.5	18.4	102.3	71.1
Ural	33.7	19.6	108.1	91.3
Tselinograd	32.2	22.3	85.5	92.5
Chimkent	26.7	16.9	93.7	79.9
City of Alma-Ata: city health department, republic institutions	80.6		127.5	
City of Leninsk	36.9		76.8	

Indicators of the availability of physicians in the principal specialties to the republic's population, including phthisiologists, are significantly below the union averages. Thus, the number of obstetrician-gynecologists per 10,000 population in 1989 was 1.7 in Alma-Ata, 1.9 in East Kazakhstan, 1.8 in Dzhambul, 1.9 in Kokchetav, 1.8 in Taldy-Kurgan and 1.7 in Chimkent oblasts, at the same time that the republic average was 2.2 (union average—2.6 per 10,000 population).

The availability of pediatricians, including neonatologists, was 5.1 for the Kazakh SSR as a whole, as compared to a union average of 5.5. The availability of pediatricians is even worse in East Kazakhstan (3.9), Kokchetav (3.7), North Kazakhstan (3.3) and Tselinograd (3.4) oblasts.

Availability in the republic as a whole in relation to specialties such as neuropathology and psychiatry is almost half the union average.

The largest number of physicians are concentrated in Alma-Ata, where there are 80.6 physicians per 10,000 population, with regard for specialists employed by republic institutions. However, this indicator is significantly lower for the population of the oblast of the same name (27.0).

While in large cities and oblast centers of Kazakhstan the availability of medical personnel is rather high, in rural areas the indicators are significantly lower. For example the availability of physicians in rural administrative regions of the Kazakh SSR is almost twice poorer than in the republic as a whole (19.3 as opposed to 36.4). In this case the availability of physicians in rural rayons of Dzhambul (14.6), Karaganda (17.3), Kustanay (18.3), Pavlodar (17.7), North Kazakhstan (18.3), Taldy-Kurgan (18.4) and Chimkent (16.9) oblasts does not even reach the analogous republic average (19.2). We cannot name a single oblast in Kazakhstan in which the availability of physicians in rural areas is equal or at least close to the urban level. The contrast is especially striking in this aspect between urban settlements and rural areas of oblasts possessing medical institutes and in which large cities and oblast centers are satisfactorily supplied with medical personnel (Aktyubinsk, Karaganda and Semipalatinsk oblasts, Alma-Ata).

Urban settlements and rural areas are supplied with physicians more uniformly but at a very low level in oblasts with a predominantly agrarian profile (Alma-Ata Oblast less the city of Alma-Ata, and Kokchetav, Taldy-Kurgan and Tselinograd oblasts).

The availability of secondary medical workers in the republic also remains insufficient. There are, however, oblasts in which the republic and union averages been not only been reached, but also surpassed: Dzhezkazgan, Karaganda, Kzyl-Orda, and the city of Alma-Ata. But once again, this pertains chiefly to major cities and urban settlements of these oblasts. The rural regions are supplied with secondary medical personnel, and physicians as well, to a significantly lower extent than the republic and the country as a whole. A catastrophic shortage of secondary medical workers is suffered by rural institutions of Dzhambul (69.8 per 10,000 population), Karaganda (70.7), North Kazakhstan (70.9) and especially Semipalatinsk (58.5) oblasts. And this is despite the fact that all of these oblasts have special educational institutions training secondary medical personnel.

One of the principal indicators of the use of the labor resources of medical personnel is the ratio of the number of secondary medical workers to the number of physicians. In the opinion of N. F. Ilicheva et al. (1989) the optimum variant is one in which there are four to five secondary medical workers for every occupied doctor's position in a hospital. This makes it possible to organize the work of physicians sensibly, and to maintain the therapeutic and diagnostic process at the required level (Table 2).

Table 2. Ratio of the Number of Occupied Secondary Medical Worker Positions to the Number of Occupied Doctor Positions in Hospital Institutions of the Kazakh SSR in 1989, Broken Down Into Stages of Health Care

Oblast	Ratio of the Number of Secondary Medical Worker Positions to the Number of Doctor Positions					
	Total	Oblast Institutions	City and Urban Settlement Institutions	Central Rayon Hospitals in Cities	Central Rayon Hospitals in Rural Areas	Rural Section Hospitals
Kazakh SSR	2.8	2.4	2.7	2.8	2.9	4.2
Aktyubinsk	2.7	2.7	2.5	2.7	2.6	4.1
Alma-Ata	2.7	2.4	2.4	2.4	2.8	3.3
East Kazakhstan	3.0	2.6	3.0	2.8	3.3	4.6
Guryev	2.6	2.1	2.6	2.7	2.6	3.8
Dzhambul	3.0	2.5	3.1	-	2.8	4.0
Dzhezkazgan	3.0	3.0	2.9	2.9	2.9	4.8
Karaganda	2.7	2.6	2.7	2.9	2.4	4.2
Kzyl-Orda	3.1	3.1	-	4.6		
Kokchetav	3.2	2.6	2.9	3.1	3.4	5.9
Kustanay	2.9	2.3	2.6	3.1	2.9	5.9
Pavlodar	2.9	2.6	2.7	3.0	3.3	5.1
North Kazakhstan	2.7	2.5	2.3	2.8	2.8	5.8
Semipalatinsk	2.5	2.1	2.5	2.3	2.4	4.0
Taldy-Kurgan	2.7	2.4	2.5	2.5	2.9	4.0
Ural	2.8	2.1	3.4	2.7	2.6	4.4
Tselinograd	3.0	2.3	2.8	3.1	3.6	5.6
Chimkent	2.8	2.2	2.6	3.0	2.7	3.4
City of Alma-Ata2.4	-	2.4	-	-	-	

It is evident from Table 2 that hospital institutions in none of the oblasts possess enough secondary medical personnel to attain the recommended ratio. The lower the stage of health care, the more optimum this ratio is. This pattern is observed in all oblasts. Unfortunately, however, the illusory well-being in rural section hospitals is often the result of a pronounced shortage of physicians in them.

We already mentioned the low availability of physicians in rural rayons of certain oblasts of Kazakhstan. We should concurrently emphasize the low ratio of medical personnel in Alma-Ata, Guryev and Chimkent oblasts at all levels of hospital care, which doubtlessly attests to the extreme need suffered by public health in these oblasts for secondary medical workers.

The shortage of secondary medical workers in hospital institutions compels the physician to do work outside his job description, and it distracts him from the therapeutic and diagnostic process per se. In this case irrational personnel placement and an improper personnel ratio reduce both the economic and the medical effectiveness of utilizing specialists. O. A. Aleksandrov et al. (1985) believe that in the future we should strive to change the numerical ratio between physicians and secondary medical workers in the direction of increasing the proportion of the latter.

As was demonstrated above, the number of both physicians and secondary medical personnel is still inadequate in our republic. Their scarcity is especially tangible in rural areas. In our opinion such a nonuniform and unjust distribution of medical personnel is the result of a lack of adequate attention on the part of administrative organs toward personnel and other social problems in the rural areas. That is, the same trends that have evolved in the national economy as a whole are manifesting themselves here: Relegating agriculture to a secondary and nonprestigious rank has caused rural areas with a weakly developed infrastructure to fall far behind, and to decline.

The results of our analysis of the availability of medical personnel to the population of the Kazakh SSR would properly be considered in conjunction with their sensible use. The best medical impact from assets invested into personnel training can be attained by raising the quantity of physicians and secondary medical personnel to the optimum number, and what is even more important, by sensibly distributing them and raising their qualifications. We think that a combination of intensive and extensive paths of development is needed in the personnel policy of the republic's public health system.

Health Workers Threaten Strike

927C0113A Moscow PRAVDA in Russian 30 Oct 91 p 3

[Interview with RSFSR Public Health Workers' Trade Union Central Committee Chairman M. Kuzmenko by V. Proskurina: "'The Doctors Are Fighting for All of Us'"]

[Text] The following telegram was recently sent to Kemerovo from Moscow:

"The trade union central committee fully supports the fight of public health workers of Kemerovo Oblast for their social rights. In turn, the trade union central committee has demanded that the Russian government immediately increase the wages of public health workers. Support has been obtained in the Supreme Soviet's Public Health Committee, from Vice President Rutskiy and from RSFSR Supreme Soviet Acting Chairman Khasbulatov. If the demands of the trade union central committee are not met, an all-Russian strike of public health workers will be called in the first half of December. We wish you success in your struggle. RSFSR Public Health Workers' Trade Union Central Committee Chairman Kuzmenko."

[Kuzmenko] It wasn't just today that the struggle of public health workers for their rights began. The strike began coming together back in December of last year. We can understand the medical workers. They've been held in limbo for the last several decades. Judge for yourself how much the gap has increased between the average wages in the national economy as a whole and in public health: In 1960, medical personnel received 80.5 percent of average wages, while this year according to preliminary data they received 54.6 percent. But the problem doesn't lie with just wages alone. As before, public health is continuing to be funded in accordance with the residual principle. The proportion of the RSFSR's gross national product spent on medicine is only 4 percent, as compared to 6-10 in developed countries. Hospitals have exhausted their resources: They can't even satisfy their most basic needs. It's embarrassing to even talk about the food patients get. How can you treat the sick under such conditions? So let's not let people think that doctors are concerned only with their own pockets. They are fighting for all of us.

[Proskurina] But do I recall correctly that the Russian government gave assurances that it will rectify the situation at the beginning of the year?

[Kuzmenko] Yes, an agreement was in fact signed between the RSFSR Council of Ministers and the Council of the Federation of Independent Russian Trade Unions to increase the wages of public health workers to the level of average wages in the national economy. Salaries were increased on 23 February. However, the economic reform reduced the small raise to naught. Once again medical personnel found themselves at the very bottom. And when you consider the conversion to new retail prices, it is as if the tens of billions of rubles promised by the government had never entered the public health budget. And how are we to feed our patients today, if just a little while ago potatoes cost 10 kopecks, and now they cost 2 rubles?

[Proskurina] What is your opinion as to why the strike of the medical workers began in Kuznetsk Basin, even though the situation is approximately the same in all regions of Russia?

[Kuzmenko] The example of the miners, who managed to get most of their demands satisfied, doubtlessly had an effect. And now there is a tenfold difference in the wages between miners and medical workers. Hospitals in the Kuznetsk Basin are in a terrible state. Kemerovo medical workers are now receiving support from their colleagues in many regions of Russia. Telegrams have just arrived from Vladimir Oblast, the Komi ASSR and the Jewish Autonomous Oblast.

[Proskurina] What position is the Russian health ministry taking in light of these events?

[Kuzmenko] The ministry is naturally interested both in improving the funding of public health as a whole, and in raising wages. However, from my point of view it is not acting as decisively as we would want. And this is at a time when the republic's public health is at a critical point.

First Soviet Pediatric Bone Marrow Transplant Center

927C0113C Moscow SOVETSKAYA ROSSIYA in Russian 31 Jul 91 p 4

[Article by E. Sutotskaya, Moscow: "Hopes Have Been Raised"]

[Text] The capital's institute of children's oncology opened a bone marrow transplant department. This is the first Soviet clinic. The German company Steag helped to equip it. Our surgeons have already acquired experience in highly complex operations. Now, using progressive foreign procedures and new equipment, they will be able to carry out considerably more of them.

The new equipment is warrantied for 8-10 years. Specialists who will be servicing it are now undergoing training. The clinic meets all international technical standards, which will make it possible to invite specialists to the children's oncology institute from other countries in order to exchange experience and carry out joint operations.

Pediatric Organ Transplant Center Opens

927C0113D Moscow IZVESTIYA in Russian 26 Sep 91 Union ed. p 3

[Interview with USSR Academy of Medical Sciences Academician Yu. Isakov by L. Ivchenko: "Organ Transplants Will Become More Available"]

[Text] An international medical institution has now appeared in Moscow—the World Pediatric Organ Transplant Center. It was established on the basis of the All-Union Center of Pediatric Surgery, Reanimation and Anesthesiology, and it has become yet another base for the World Children's Organ Transplant Fund.

What brought about the need for establishing it in our country, and what are the prospects of such "membership"? We turned to USSR Academy of Medical Sciences Academician Yu. Isakov, the new center's director and the

chairman of the pediatric surgery department of Moscow Medical Institute No 2, with this question.

[Isakov] This is a humanitarian agreement between medical workers of different countries having the goal of saving the lives of children. It provides us a possibility for joining the international effort in pediatric organ transplants. The need for such medical assistance is very great. It would be sufficient to say that each year around 2,000 children in our country require kidney transplants. But over a span of several years we have carried out only about 100 operations. And not because we don't know how: There are a mass of complications—in obtaining donor organs, in preserving them, in determining which would be most compatible with the patient, and so on. We need a good donor service, and a well tuned organization to manage the entire effort. My hope is that we will be swept into the mainstream of this work, and that in order to save a child's life we will be able to receive a donor organ from another country if we cannot obtain it in our country at the moment, or send the child to another country for treatment to be paid for by assets from the Fund, or in turn invite patients here for surgery—we have absolutely no intention of living off others. Our pediatric postoperative care is well organized, complex microsurgery is conducted at the level of world standards, and we've got kidney transplants down: Many of our former patients already have their own families, and some of them have themselves become mothers, having safely endured the critical period of pregnancy and labor. The center is well-equipped, no immediate financial expenditures will be required, and international cooperation and exchange of experience will help us to carry out complex operations such as children's kidney transplants faster.

[Ivchenko] What kind of organ transplants are you hoping to master in the immediate future?

[Isakov] The liver, the pancreas, bone marrow. Our doctors are technically able to carry out, in particular, bone marrow transplants in children suffering leukemia, but we don't have a data bank. It is important for us to create a computer network which would be included in an international network and permit us to exchange information. And then many who must now go abroad for surgery will no longer have to seek hard currency, sponsors and benefactors for this purpose. Such operations are very expensive in hard currency, and only a few are able to have them. Why can't we carry out such operations ourselves?

[Ivchenko] With what centers will you establish cooperation?

[Isakov] The World Children's Organ Transplant Fund has its own basic institutions in Brazil, Colombia, Costa Rica, Mexico, the USA, and now the USSR. The headquarters of this substantial organization, which possesses considerable assets, is in Los Angeles. We have a very great need for such cooperation. For example, our most difficult problem right now is to draw up the legal principles by which to expand the possibilities of obtaining donor organs. These ethical issues have been completely resolved abroad. Participation in the work of the World Fund will also provide us with favorable conditions for training specialists.

Dioxin Contamination of Water

927C0113E Moscow TRUD in Russian 2 Nov 91 p 2

[Article by M. Labinskiy, Moscow, "We Are Drinking Dioxin- Contaminated Milk to the Health of Ourselves and Our Children"]

[Text] Well, I never thought I'd live to see this day! Ordinary people, and not just experts in chemistry, now have to learn what there is to learn about a purely scientific concept—dioxins. And learn not out of curiosity and analyze not out of nothing else to do, but for precisely the opposite reason—because something has to be done! Ecological illiteracy, or what might be more accurately called ignorance of the knowledge that the world now possesses, is already producing terrifying results—a decrease in immunity, and the worst kind of illnesses in people. We are becoming hostages not only of all kinds of ecological disasters due to thoughtless economic activity, but also of an outwardly innocent "experiment" on millions of "volunteers" suspecting absolutely nothing.

Here's one example. At the end of summer 1990 we received 42,500 tons of meat from China in exchange for timber. The contract stating the terms of this deal, which was coordinated with the USSR Ministry of Health, states that the concentration of notorious DDT in the meat exceeds Soviet sanitary norms by seven times. And even these norms are hardly strict. Nor is an attempt made to conceal presence of chlorofos, dikhlofos, phenochlorofos—terms which unfortunately need not be explained to anyone.

Here's another example. The tragedy in Ufa in spring of last year, when pesticides washed into the river from storage sites of the Khimprom Production Association poisoned the water with dioxin and phenol at the city's water intake, located downstream (!). This tragedy not only exposed the "dioxin problem," the existence of which had been carefully hushed up in our country until recent times, but also once again revealed the irresponsibility of agencies that are supposed to be protecting the environment, and consequently your health and mine as well. A government committee established with the idea of objectively analyzing the situation had as one of its members, of all people, V. Gusev, who was then the head of chemical industry. He was doubtlessly aware of the full truth about the poisoning of drinking water in the Ufa water supply. Nor could A. Kondrusev, the chief state public health physician, have been unaware of it. Nonetheless Ufa's residents never did learn about the presence of dioxin in the poisoned water.

I might recall to specialists that among all poisons consciously or unwittingly produced by man in the course of all of his activity, dioxins are especially terrifying. They are a side product of numerous production processes based on use of chlorine and its compounds. According to estimates of scientists in different countries, dioxin and compounds of that sort are absolute poisons that affect all living organisms.

Later on another committee came to Ufa, and a working group was established to analyze the ecological situation. But even representatives of substantial unionwide institutions such as the State Committee for Protection of Nature, the Ministry of Health, the Academy of Sciences,

the State Hydrometeorological Committee and others did not provide any answers to the questions. All that was revealed was that our country lacks the equipment it needs for the research, and that imported equipment purchased earlier and provided to leading scientific organizations studying dioxins was in disrepair.

Does this mean that we must once again live blind? In any case we can console ourselves with the fact that we now do know more about this "absolute poison." It has been shown for example that even extremely low doses of it possess a broad spectrum of biological action on all aerobic organisms, suppress immunity, and are capable of a mutagenic, carcinogenic and embryotoxic effect. Moreover this effect amplifies with each new dose that we breathe in with air, or eat with our lettuce, or drink with water.

The poison has the insidious ability to include itself in processes occurring in the living organism, to remain chemically and thermally stable for decades, and to pair up in countless ways with various chemicals, including medicines. That which had been more or less safe becomes a poison. The toxicity of phosphorus-containing pesticides, for example, increases by 5 to 10 times in the presence of dioxins.

Children of course are the most vulnerable. This is confirmed in experiments by American toxicologists. Very small doses of dioxin were added to the feed of Javanese monkeys, rats and mice. Their progeny were distinguished by unusual aggressiveness, and it was hard to train them. Need we be amazed by the rate of growth of crime in our country, and of cruelty and mental degradation in children, if dioxins are detected today not only in the milk of nursing mothers but also on infant-soiled diapers!

The only consolation is that the alarm is being sounded throughout the world on this account. The USA, Canada and Japan have developed major ecological programs foreseeing reduction of discharges of dioxins and other toxins into the environment, containment and destruction of these compounds in the places of their accumulation, and protection of nature from them. These countries also reevaluated the safety of all preparations previously created for use in the home, in medicine, in agriculture and for industrial needs. And the year 1980 marked the beginning of yearly international conferences titled "Dioxin and Kindred Compounds." A program titled "Dioxins in Mothers' Milk" has been sponsored by the World Health Organization (WHO) since 1985. Six hundred amendments and additions have been made to American legislation in regard to the strategy and tactics of protecting the environment and the population from toxic compounds.

We on the other hand, who began developing our own and importing foreign dioxin-containing products in the 1970s, are unable to stop even today. Despite an official ban, DDT has been used in our country for the last two decades. A decision to halt the use of hexachlorane, the extreme toxicity of which was established back in the 1950s, was not made until the late 1980s. It was not until the second half of the 1980s that use of dioxin-containing products in farming began to be limited (to say nothing about banning them!).

The concentration of poisonous substances in water is increasing with every year. Today according to data of the USSR State Committee for Protection of Nature the condition of water in our country is critical. But even here the USSR Ministry of Health is able to extricate itself from this unfavorable situation. Capitalizing on the fact that for most people specific figures characterizing the PDK (maximum permissible concentration) of poisons in water and in foodstuffs mean practically nothing, it is reviewing the public health norms adopted in 1984 with an eye on predominantly increasing them. But even without doing that, they exceed the norms adopted abroad by a dozen times! We can "drink" 3.5 times more phosphates in water than Czechs, Romanians, Bulgarians and Cubans, and 7,000 (!) times more strontium. Standards limiting the concentration of mercury, chromium, bromine and petroleum in drinking water are altogether absent. It was not until 5 May 1991 that the USSR Ministry of Health established the norm for the maximum permissible concentration of dioxins in drinking water. It exceeds that of most foreign countries by a thousand times.

And in the meantime the medical and ecological situation in the country grows continually worse. The scale of dioxin discharges into the environment causes us to anticipate growth of the already acute medical, ecological and associated socioeconomic problems. Already today, statistics show that each year 11.2 percent of children are born with physical and mental disorders. Out of every 100,000 children, 11,000- 12,000 have oncological diseases. Around 8 percent of Moscow's children (the situation is even worse on the outskirts) are oligophrenics. And this is only the officially registered number, since diffuse forms of debility are not recorded in our medical practice.

The process of degradation—physical and mental—elicited by the influence of environmental contaminants is accelerating. Unless we take immediate steps, the degradation may reach such a depth that it will be impossible to save the nation's gene pool! Here are just a few figures to support this. In 1959 agriculture used 5 kilograms of chemicals per capita. The proportion of all children born with genetic deviations was 0.74 percent. In 1983 the volume of chemicals applied to the country's farmland increased to 25 kilograms per capita. The number of children born with genetic disorders increased to 16.5 percent. And biologists established long ago that a population that is 30 percent genetically "spoiled" is doomed to degeneration.

I am saying all of this not in order to frighten the readers. And anyway, we're not so easily frightened! The truth is in something else: Our country has specialists that understand this problem fabulously. But at a higher level—the government and state level—the problem of protecting people from bureaucratic ecological tyranny has not been addressed. Our country is the only one of all industrial developed countries that does not have a state program on the dioxin problem, or that is not participating in international cooperation in either the framework of scientific exchange or in the framework of WHO. Which means that it will obviously be a long time yet before we are able to drink pure water and breathe fresh air. Perhaps never?

New Long-Term Care Department at Tallinn Hospital for Infectious Diseases

927C0118A Tallinn VECHERNIY TALLINN in Russian 4 Jul 91 p 3

[Article by Galina Melikova: "New Department in Infection Hospital"]

[Text] Medical workers are very familiar with the situation where a patient who has completed his course of treatment "gets stuck" in the hospital for an indefinite time. His relatives are in no hurry to take him back. So what do you do, evict him forcibly? There is no legal basis for doing so. Of course, the reasons for this may vary quite widely, but one of the usual ones is that not everyone can provide care in the home of the sort offered at a hospital.

Medical workers of the Tallinn Infection Hospital took it upon themselves to resolve this timely problem and relieve the burden on city hospitals to some degree. There were grounds for doing so. Recently the number of patients in the hospital diminished noticeably, and the medical workers found complaints about all of their beds not being occupied annoying.

And so on 1 July a department that has come to be called the department of long-term care opened in the building for noninfectious patients. The first patients appeared.

"Let me emphasize right away that this is not any sort of hospital for 'chronic patients,' or an old-age home, where patients will be cared for as long as they live," said Nelli Kalikova, deputy chief physician of the infection hospital. "First of all this is a *therapeutic* department, one of the objectives of which is to care for patients languishing in hospitals. Although we already have a constant flow of requests from patients wishing to transfer to this department, we try to explain to everyone that we don't take patients with just any diagnosis. We adhere strictly in this case to the rules spelled out by the city health department. The first priority is for patients with chronic diseases of the gastrointestinal tract and the lungs, and cancer patients. For the moment we are turning away heart attack patients, of whom there are so very many."

There is one other important point in regard to this: The time a patient remains in the long-term care department will be determined specifically with regard for his needs. The department can accommodate 60 beds.

"Bed space costs a great deal of money in various countries. What about here?"

"We will obviously also have to establish fees for space in this department. During our breaking-in period—a month or a month and a half—we will see how things go, and determine how much the services will cost. But there is one thing that we can say right now: Relatives are eager to pay for them. And persons living alone could deduct the expenses of caring for them out of their pensions.

"The department has been staffed by attendants, but more orderlies will be required as it expands. Selection of personnel was approached seriously: We didn't take just anyone, we took knowledgeable people who were also warm and charitable. Others simply wouldn't fit in here. I'm happy to say that young workers will also be helping out. Although the hospital's resources are limited, it is felt here that we need to find a possibility to pay satisfactory wages to the medical personnel for their difficult work. Otherwise we couldn't keep people on the job."

We toured the wards of the new department. They are clean and comfortable. They accommodate three or more patients, and there are women's as well as men's wards. A row of wheelchairs was parked in the hall. I was told that they came to the hospital as humanitarian assistance from Finland. But the demand for such equipment, and other equipment that would make caring for bedridden patients easier, has not been met, and the medical personnel hope that as assistance arrives from abroad, they will continue to think of this department first.

As we said goodbye, newspaper photographer Mati Khiys snapped a picture of the department's friendly collective together with the hospital's chief nurse, Greta Lekhtla (fourth from the right [photograph not reproduced]), who contributed a great deal to establishing the long- term care department.

Purity, Safety of Water Concerns Moscow Officials

927C0118B Moscow SOVETSKAYA ROSSIYA in Russian 12 Jul 91 p 4

[Article by M. Aleksandrova, Moscow: "Not Any Cheaper Than Beer..."]

[Text] **Today's ecological situation is not a comforting one. More and more complaints are being addressed toward Moscow's drinking water. The Moscow City Soviet did not leave this problem unattended: It ordered the chemical faculty of Moscow State University to check the city's water source. How serious was the situation? Laboratory specialist P. Demyanov comments on the situation:**

"Using chlorination of water to control microbes was conceived of long ago, and it is a method that is still in use today. However, somehow it was not realized right away that by destroying certain powerful components in water we add others to it. In particular, humic and fulvic acids form when chlorine reacts with water. They are no less dangerous to human health than microbes or bacteria. How do we rectify the situation? One of the ways is to change the method itself of purifying natural water. For example disinfecting water with ozone has already been the preferred method for a long time abroad. Another way is to improve biochemical water treatment in such a way as to minimize the quantity of organochloride compounds. This requires research on the mechanism of chlorine formation in drinking water—something no one in our country is competently doing."

Are we witnessing dramatic deterioration of our drinking water? The reservoirs on the Moskva River have not of course become any cleaner in the last few years. Smog is settling in our drinking water sources. Industrial wastes are being dumped into them, and they receive runoff from agricultural land. Of course, ideally we would be using

water free of organic compounds. But unfortunately under our conditions acquisition of harmless and ecologically pure drinking water is being hampered by a shortage of assets and the absence of the necessary equipment.

We've heard references to the so-called regional "lottery" on several occasions. It seems that water in some parts of Moscow is cleaner, and dirtier in others. Water is prepared for drinking at four identical water works of the city: Severnaya, Vostochnaya, Zapadnaya and Rublevskaya. Natural water is of course obtained from sources with different ecological indicators. But it would hardly make any sense to talk about the advantages of certain rayons over others. Each has its problems.

There is one other factor—the time of year. Water quality depends directly on it. In winter, snow "dictates" its conditions, while in summer we cannot ignore warming of drinking water sources. Spring is generally a time of maximum activity of biological organisms. Ideally there should be a particular water treatment procedure for each period of the year.

How, then, do we attain maximum safety for ourselves in the difficult conditions we face? Don't turn on the hot water tap for a long time, since intensive evaporation of organochloride compounds occurs. If you want to take a hot bath, fill the tub with water and let it sit for a little while. Toxic compounds volatilize rather quickly. Heating a tea kettle to full boil is not recommended either. In general, a kettle or pot shouldn't fog up the kitchen.

Now about our specific prospects. Special materials that absorb toxic components out of water—sorbents—have been widely used in the world for a long time now. These substances are rather complex in their chemical composition. Installing sorption facilities is expensive. Nonetheless this is something which we will do. In the very near future we will begin building new modernized water works based on modern drinking water purification methods.

A global exchange of experience with foreign associates is presently going on in regard to this issue. In particular, a Soviet-French conference titled "Drinking Water Quality" was recently held in Moscow. It must be said that the largest drinking water research center is located in Paris. Its annual budget is $8.5 million. In this case around $1.5 million are spent on renewal of scientific equipment. French scientists are prepared to provide us with samples of the latest treatment equipment. We will also do a great deal of scientific work together with them.

And one last thing. Pure spring water in plastic bottles has already been on the market abroad for a long time. It can be acquired in any store—for example, Borzhomi or Narzan [transliterations]. In Italy for example, a bottle of drinking water goes for the price of table wine, and in Germany it costs as much as beer. In the not too distant future we also plan to build plants producing plastic bottles filled with purified spring water on a major scale. Incidentally, the first experimental plant is already operating in Alma-Ata. Its products enjoy an enormous public demand. The cost of one bottle is much lower than that of a foreign analog—around one ruble.

New Treatment Center for Pediatric Neurological Disorders

927C0118C Moscow SOVETSKAYA ROSSIYA in Russian 12 Jul 91 p 4

[Article by B. Samoylov: "Hope Has Appeared"]

[Text] According to world medical statistics, the frequency of children's disabilities resulting from affliction of the nervous system averages four cases per thousand individuals. Children's cerebral paralysis is on the rise. According to the latest data misfortune befalls one out of every 250-300 births. During the time of intrauterine development or during labor, the child experiences damage to a portion of his brain, and owing to this, motor, speech and mental disorders arise. This happens as a result of oxygen starvation, infections and injury.

The disease is still said to be incurable, despite the fact that many scientists and practical specialists have proposed various means of fighting it. Recently established in Moscow, the Scientific Therapeutic Center for Prevention and Treatment of Pediatric Neurological Disability has finally offered the hope of recovery to hundreds of sick children and their parents.

"Our procedure," explained one of its authors, Professor I. Skvortsov, "consists of four interrelated components. First, microinjections of specially selected biologically active drugs into nerve endings of the skin, muscles and bones. The injected substances are taken up by nerve cells of the spinal cord, which is responsible for motor activity, and they normalize this activity. Physiotherapy—laser reflexotherapy, magnetotherapy—are also used to stimulate certain divisions of the spinal cord and brain. Vision and hearing are restored by a series of special exercises. And finally, the children undergo a broad complex of psychotherapeutic treatments in our center.

"I can say without exaggeration that there are no analogues of our procedure in world medical practice. With its help, we have been able to literally put as many as one and a half thousand children on their feet.

Independent Firm Provides Alternative to Socialized Medicine

927C0118D Moscow ROSSIYSKAYA GAZETA in Russian 5 Jul 91 p 3

[Article by Sergey Nikitin: "How to Save Ourselves From the Ministry of Health"]

[Text] **"A sickly horse could die in the time it takes grass to grow."—an English proverb.**

Just don't think that we want to deprive people of the last accomplishment of Soviet government—free medicine. No one is about to privatize hospitals and polyclinics: May they continue to dispense enemas and apply sutures in the name of the state. But when the sprouts of fundamentally new, progressive medical structures appear out of nowhere, demanding not a single kopeck out of the budget, and certain people try to trample them while still in embryonic form, it's no longer a joke, God forbid.

The international "AlMiB" ("Alternative Medicine and Biology") center is one such sprout, which may perhaps be destined to become a full and fruitful tree. It is an independent nongovernment company with a charter fund of 13.5 million rubles and $3 million. The co-founders are Switzerland's AdP Trading International, the USA's AdP Medika, and representing us, the Union of Red Cross Societies, the Yakutalmaz Scientific-Production Association, and a few other substantial organizations. Utilizing the principle of private insurance, the center is working in all of the basic directions—scientific research, clinical, scientific production, and health improvement.

Doctor of Medical Sciences Aleksandr Botvinov, the general director of "AlMiB," has long been a spokesman of private health insurance: in his life as a simple surgeon, during his tenure as head of Botkinskiy's Hospital, and during the time of his work in the Academy of Sciences. His main concern today is development of the "Family Doctor" system.

It essentially calls for establishing a network of special offices right at housing operation offices or in vacated apartments of residential buildings. Today there are 15 of them in Moscow, and as many more will open any day now. The number of permanent clients has reached 20,000, and according to tentative predictions it may reach up to 2 million in 1992. Affiliates of the center possessing networks of the same kinds of offices have already begun working in other regions of Russia as well— in Altay Kray, in Arkhangelsk, in Perm, in Yakutsk and in the Moscow suburbs.

When it signs a contract with a family, "AlMiB" assumes full responsibility for the health of its members. In this case the people receive the right not only to select any doctor they like but also to demand his replacement at any time without explanation. Besides a family doctor, the patient also gains access to a group of highly specialized physicians—from a surgeon to a gynecologist. Each of them is obligated to visit the patient at home or grant him an office visit at the first call. And those requiring it are sent to "AlMiB's" own consultative and diagnostic centers, of which there are already six just in the capital alone. They are furnished with Western equipment, the most up-to-date, and patients are seen by Moscow's best specialists— professors and doctors of sciences.

Clinics that will demonstrate the accomplishments of world practice are being built jointly with foreign companies. ("AlMiB" physicians will be joined here by colleagues from many countries of the world). Naturally the center's permanent clients will be the first to be treated in the new hospital.

The reader is certainly wondering how much money they take for all of this. Relatively little in current prices. An insurance policy is drawn up for each person, who pays an annual premium of R120 to R300. Juvenile invalids, pensioners and war veterans pay the minimum premium. In accordance with the insurance policy, all are guaranteed regular thorough examinations, treatment of current illnesses, and surgery in hospitals.

Take a guess: Who are the first to enroll with Botvinov? Old women living alone on tiny pensions! In the beginning they thought at the center that it was going to take some doing to scrape up a dozen or so clients of this sort each month. But they found the reverse to be true. Such people are tired of trying to deal with rayon polyclinics, and they've had enough of them. Moreover the part of the fees of state institutions represented by "gifts" and "tribute" has mushroomed: Bribes now represent a larger share. But when a patient summons a family doctor, a different psychology operates: The doctor is obligated to provide assistance!

Not only individual families but entire organizations insure with Botvinov. It is true that one small construction office recently tore up its contract—an unprecedented case in "AlMiB's" half-year's existence. What happened? It would be better to address this question to R. Anufriyev, director of the Moscow City Health Department, who gave orders to deprive all such institutions of the right to issue hospital passes. And still earlier, alternative medical organizations were prohibited from carrying out many treatment methods, writing prescriptions and sending their patients to state hospitals. And so people like Botvinov are forced to take unusual steps to solve these problems in a roundabout way.

Local tyrants are an annoyance as well. For example, when the kind of discrimination measures described above proved ineffective, and Botvinov's patients rose up in his defense as a solid wall, V. Kozak, chief of the health department of Moscow's Oktyabrskiy Rayon, simply turned off the water to the local "Family Doctor" office.

What is it that motivates the actions of the resistors? Moral imperatives, an unwillingness to make a business out of the health of Soviet people? Hardly.... Today, almost all of us, except perhaps for fanatic neo-Bolshevists, such as Nina Andreyeva, have come to understand that all goods, all services have to be paid for. In any sphere.

Consider for example our maternity hospitals. After labor, women are forced to lie somewhere beneath staircases, surrounded by filth, infection, drafts, and the caddishness and extortion of the personnel. Is this normal? A child, you see, is born only once in his lifetime, and anyone of us wouldn't give a second thought to paying money, and placing our wives in the best maternity hospital—anything to keep our offspring from coming into this world under such barbaric conditions. We don't cut any corners on wedding banquets, and we begin saving money long before the event. Could it really be that cocktails, hors d'oeuvres and a prestigious restaurant are more important to us than the health of future children? No, of course not.

Whenever a certain "servant of the people" once again begins to frighten us with the bogeyman of paid medicine abroad, a story told by the famous bicycle racer Vasiliy Zhdanov immediately comes to mind. Once in Italy the athlete lost a filling, and he was taken to a local dentist. The latter examined his teeth and was awestruck: "If I did work like this, my clients would have castrated me long ago." He then replaced Zhdanov's filling and gave him a

twenty-year written guarantee. "The tooth might shatter, signor, but not the filling. If it lasts 19 years and 11 months, by this paper I pledge to treat all of your teeth free of charge," the Italian vowed. Need I say more?

No, these people from the ministry and its local organizations are not thinking about morality when they put obstacles in the way of people like Botvinov. They tasted the benefits of paid medicine long ago, and they are quietly introducing it. But the prospects of a major market of medical services frighten them. And so they think up one stranglehold after another for their up-and-coming competitors. They create unendurable conditions, they label the doctors as second-grade, and offer no excuses for the damage they do.

Botvinov writes letters to all levels, and he speaks from lofty podiums, but none of this makes any impression on the zealots of state medicine.

"I am prepared to be inspected by any level of authority," Aleksandr Mikhaylovich exclaimed in despair. "If anyone finds that our center has done something bad to anyone, I'm prepared to abandon my idea right away."

Discussing the possibilities centers like "AlMiB" have, there is one other thing that should be mentioned—saturating our internal market with all medicines.

An odd situation has evolved in our country in this regard. Soyuzfarmatsiya, which is responsible for importing medicines, long ago transformed into one of our woefully notorious "black holes." Dozens of tons of the most diverse drugs disappear within it, never reaching the pharmacy shelves as a rule, to appear later on either in the Riga market or on the dressing tables of "servants of the people." This is a shady business, and it deserves a separate article. In any case, "AlMiB", which has direct ties with the largest pharmaceutical companies of the USA, is able to purchase all drugs there, 35 percent cheaper on the average than what it costs Soyuzfarmatsiya. And then it can sell them in all regions of Russia, for rubles, in accordance with the laws of commerce: For example, let's assume that certain pills cost 1 cent, and so they would be priced at approximately 30 kopecks. As demand decreases, the price will naturally fall. But official agencies have no intention of permitting establishment of competing channels, tenaciously holding onto their monopoly over imports.

Botvinov also proposes another more advantageous variant: going abroad and purchasing raw materials and processes to manufacture medicines locally. This would be four times cheaper than buying at a 35 percent discount. And "AlMiB" is ready to immediately open shops producing drugs in tablet form that have already been permitted for consumption in our country. Alexandr Mikhaylovich has gone many times to Moscow's Main Public Health Administration with this issue, with the hope that officials there would grant permission to sell medicine through its pharmacy network. But as you might guess, there has been no answer.

"Monopoly is a great foe of wise management," wrote Adam Smith more than 200 years ago. Much water has passed under the bridge since then, and today, all attempts to shut off the oxygen supply to competitors are treated as the worst kind of violations in all developed countries. And until our legislators and our government begin to think seriously about this problem, there will be no salvation from the monster monopolies that are paralyzing the society's development in all areas. And primarily in public health!

Personnel Structure of Scientific Research Institutes of the Ukrainian SSR Ministry of Health, and the Effectiveness of Its Use

927C0136C Kiev VRACHEBNOYE DELO in Russian No 6, Jun 91 pp 107-109

[Article by A.G. Kozlov, N.F. Belikova, G.I. Bliznyuk, T.V. Yelchits, A.Ya. Reshotka and Yu.B. Popov, Kiev Scientific Research Institute of Social Hygiene and Public Health Administration]

UDC 61/061.62/.007/477/

[Text] The network of scientific research institutes of the Ukrainian SSR Ministry of Health is represented by 37 institutes of different profiles. They may be divided by specialization into the following groups: therapeutic (14), surgical (9), hygienic and epidemiological (10), pediatric and obstetric-gynecological (3), and pharmacological and toxicological (1). The qualification structure of the scientific research institutes is shown in Table 1.

Table 1

Scientific Research Institute Profile	Number of Doctors of Sciences	Number of Candidates of Sciences	Number of Associates Without Degrees	Total
Therapeutic	154	551	397	1,102
Surgical	128	286	290	704
Hygienic and epidemiological	114	389	316	819
Pediatric and obstetric-gynecological	36	101	66	203
Pharmacological and toxicological	16	59	21	96
Total	448	1,386	1,090	2,924

Among other components of scientific potential, scientific personnel are the principal custodians of information [1,5]. Development of scientific knowledge rests upon the collective creativity of scientists. Organization of an environment capable of stimulating the creativity of researchers has great significance to the successful work of a collective. Optimum utilization of the personnel potential is a prerequisite of improving the effectiveness of

scientific research [2]. Publishing volume is presently the most widespread criteria by which the results of the labor of scientists are evaluated.

Calculations showed that in 1989, the number of articles published in Soviet and foreign journals per scientific associate was 1.45 in scientific research institutes of the therapeutic profile, 1.62 in surgical institutes, 1.5 in pediatric and obstetric-gynecological institutes, 0.60 in hygienic institutes, and 0.66 articles in scientific research institutes of pharmacology and toxicology. A comparative assessment would show that the number of publications is not distributed uniformly among the different groups. A more-detailed analysis of the activities of the scientific collective can be achieved by the method of calculating the coefficients of correlation between different variables. Does a correlation exist between the productivity of a scientific organization on one hand and the qualification structure of the collective, the age of the scientist and the dynamics of transition of scientific workers to a higher phase of scientific activity on the other? Our calculations were based on statistics: the number of articles published in Soviet and foreign journals, expressed per scientific associate, and in relation to indicators describing the structural composition of the collectives—the percentage of doctors and candidates of sciences, the percentage of scientific associates not possessing an academic degree, the percentage of persons of retirement age, the percentage of auxiliary personnel who have defended candidate dissertations, and the ratio between doctors and candidates of sciences.

It follows from the calculations that the labor productivity of scientists is associated with their professional scientific growth, as is evidenced by the high correlation between indicators such as defense of candidate dissertations and publishing volume. The productivity of scientists correlates with the number of auxiliary personnel at a scientific research institute.

Data of the Center for Analysis of Scientific-Technical Potential and the History of Science [4] were used as the basis for proposing the module of personnel qualification structure M_q as a way to assist the work of managing the scientific research process. This indicator reflects the numerical relationship among the following qualification groups: doctors of sciences (D), candidates of sciences (C), scientific workers without an academic degree (W), specialists with a higher education serving as auxiliary personnel (H), specialists with a secondary education (S), and other workers (X). The proportions are expressed per candidate of sciences. The authors define a qualification module of the personnel structure as a cell in which one candidate of sciences and the corresponding number of other scientific workers are united by the research process. Use of this indicator makes it possible to evaluate and regulate the qualification structure of personnel in scientific institutions, and to plan personnel training. The optimum variant of the personnel structure of a scientific collective appears as: $M_q = 0.2D + 1C + 1.8W + 0.9H + 0.4S + 0.6X$. We did not analyze the structure of auxiliary personnel, for which reason we combined them into a group as HSX, summing their values together (1.9).

The results of analyzing the qualification structure of the scientific research institute system of the UkSSR Ministry of Health are shown in Table 2. The calculation results indicate that certain groups of scientific research institutes are not staffed by enough scientific associates lacking an academic degree. This is despite the fact that this is the category that is responsible for growth of scientific personnel in collectives.

Table 2

Scientific Research Institute Profile	Personnel Composition
Therapeutic	$M_q = 0.29D + 1C + 0.73W + 1.49$ HSX
Surgical	$M_q = 0.45D + 1C + 1W + 1.6$ HSX
Pediatric and obstetric-gynecological	$M_q = 0.36D + 1C + 0.65W + 1.49$ HSX
Hygienic and epidemiological	$M_q = 0.29D + 1C + 0.81W + 2.4$ HSX
Pharmacological and toxicological	$M_q = 0.27D + 1C + 0.36W + 4$ HSX

Analysis of the correlations established that the effectiveness of the labor of scientists is associated with the availability of auxiliary personnel in the collectives: Scientists spend a significant part of their work time—2.4-1.8 hours—doing unskilled work [4]. Study of the qualification structure showed that some scientific collectives do not have enough auxiliary personnel, especially institutions in the therapeutic and pediatric groups. As far as the availability of doctors of sciences in scientific collectives is concerned, this indicator is high.

The scientific personnel structure should be regulated and scientific workers should be planned for and trained with regard for requirements on the age structure of scientific collectives. A tendency for the rate of growth of the number of scientific associates to increase and for the number of young specialists to decrease is presently observed [3,6]. As we know, scientific workers are most productive when they are 30-40 years old [4]. The average age of associates was 42 years for scientific research institutes of a therapeutic profile, 44 for surgical and hygienic institutes, 43 for pediatric institutes, and 46 years for pharmacological and toxicological institutes.

And so, the low work effectiveness of scientific research institute collectives is associated to a significant degree with features of their qualification structure. Not only the qualifications of the scientific worker and the possibilities for making optimum use of work time but also organization of material and information support to scientific research has an influence on the effectiveness of the labor of scientists.

Bibliography

1. Dobrov, G. M., Karpov, V. I. and Kolganov, V. L., "The Problem- Oriented Approach to Forming Scientific-Technical Potential," NAUKOVEDENIYE I INFORMATIKA, No 29, 1988, pp 1-10.

2. Kara-Murza, S. G., "Problemy intensifikatsii nauki: Tekhnologiya nauchnykh issledovaniy" [Problems of Intensification of Science: Scientific Research Procedures], Moscow, Nauka, 1989, 248 pp.

3. Lakhtin, G. A., "Taktika nauki" [The Tactics of Science], Novosibirsk, Nauka, 1969, 252 pp.

4. "Nauchno-tekhnicheskiy potentsial: struktura, dinamika, effektivnost" [Scientific-Technical Potential: Structure, Dynamics, Effectiveness], Kiev, Nauk. dumka, 1988, 377 pp.

5. Pelts, D. and Endryus, F., "Uchenyye v organizatsiyakh. Ob optimalnykh usloviyakh dlya issledovaniy i razrabotok" [Scientists in Organizations. Optimum Conditions for Research and Development], Moscow, Progress, 1973, 472 pp.

6. Terentyev, P. K., "Labor Productivity and the Age of a Scientist," NAUKOVEDENIYE I INFORMATIKA, No 29, 1988, pp 18-23.

Incidence of Some Diseases of Internal Organs Among the Rural Population of Zhitomir Oblast

927C0136D Kiev VRACHEBNOYE DELO in Russian No 6, Jun 91 pp 109-111

[Article by V.I. Maltsev, M.Yu. Kolpakov, V.I. Shatilo, V.A. Golovko, V.S. Didyk and A.V. Yakobchuk, Zhitomir Oblast Executive Committee Health Department, Pervomayskiy Section Hospital]

UDC 616.1/.4(-202)

[Text] Successful development of therapeutic and preventive measures requires a knowledge of the actual incidence of diseases among certain population groups. In this connection we studied the incidence of cardiac ischemia, arterial hypertension, chronic bronchitis and gastric and duodenal ulcers among the rural population serviced by the Pervomayskiy Section Hospital in Zhitomir Oblast. This medical section was selected first because the conditions under which its population resides are typical of all of the northern part of the Ukrainian SSR. Second, as a rule all diseases of the internal organs that are revealed are predominantly cardiological, gastroenterological and pulmonary [4]. Third, published data on the actual incidence of the listed diseases in the rural population are few and contradictory [3,5,6,7].

Beginning in 1986, the entire population of the Pervomayskiy rural medical section has been regularly examined two or three times a year by medical teams consisting of qualified specialists of all profiles in connection with the accident at the Chernobyl Nuclear Power Plant. In 1986-1989, the section's adult population (1,700 persons aged 15-95 years, 45 percent men and 55 percent women) was examined by physicians of all specialties eight times. Moreover, when so indicated, the necessary supplementary laboratory analyses and instrumental research (including the most sophisticated) were carried out with the participation of specialists of the oblast hospital, a scientific research institute and clinics of the city of Kiev. The results were compared with published data for the four indicated therapeutic diseases.

According to the information of some authors [6,9] the incidence of cardiac ischemia among different population groups varied within 4.7-33.2 percent. According to our data it was 13.6-13.8 percent (the methods employed included evaluating the resting EKG using the Minnesota code, biochemical analysis of the lipid level, measuring arterial pressure, and interviewing patients by means of the system proposed by WHO for revealing stress-related angina pectoris etc.). Thus considering that 2-3 percent of the section's population had not undergone annual periodic examinations for various reasons, the incidence of all forms of cardiac ischemia among the adult population in the section did not exceed 13.6-13.8 percent.

The incidence of arterial hypertension, including all of its forms, varied within 9.4-35.1 percent according to data of different authors [5,6,7,9]. According to our research the detectability of this disease was 16.5-16.8 percent.

Chronic respiratory diseases remain one of the most important problems. Growth of chronic nonspecific diseases of the lungs (primarily chronic bronchitis), the number of which has doubled every 10 years, has been noted. In the USSR, chronic bronchitis morbidity doubled in the last 10-15 years (7-9.8 percent of the adult population is afflicted) [8]. Chronic bronchitis was revealed among 18 percent of livestock raisers [3]. Chronic bronchitis morbidity in the rural population of the Pervomayskiy medical section was 9.4-9.7 percent. Besides the traditional methods, modern apparatus (for pneumoscreening) was used to diagnose chronic bronchitis, which made it possible to detect preclinical forms of the disease.

According to certain authors [1] 5-10 percent of the population suffers ulcers, while according to others 2-3 percent do so; in this case urban residents are afflicted twice as often [2]. The urgency of the ulcer problem is determined by the fact that ulcers are the main cause of disability in 68.4 percent of men and 30.9 percent of women suffering diseases of digestive organs [2]. Our results showed that ulcers were revealed in 2.1-2.2 percent of the rural population (fibrogastroduodenoscopy coupled with biopsies was the main method of diagnosis).

Thus numerous repeat examinations of the adult population of the Pervomayskiy rural section of Zhitomir Oblast over a period of 3 years revealed cardiac ischemia in 13.6-13.8 percent of the population, arterial hypertension in 16.5-16.8 percent, chronic bronchitis in 9.4- 9.7 percent, and ulcers in 2.1-2.2 percent. These data apparently correspond to the actual incidence of the indicated diseases among residents of northern oblasts of the Ukrainian SSR,

and they may be used by public health agencies and institutions for implementation of adequate preventive and rehabilitation measures.

Bibliography

1. Degtyareva, I. I. and Kushnir, V. Ye., "Yazvennaya bolezn" [Ulcers], Kiev, Zdorovya, 1983, 288 pp.

2. Dorofeyev, G. I. and Uspenskiy, V. M., "Gastroduodenalnyye zabolevaniya v molodom vozraste" [Gastroduodenal Diseases in Young Age], Moscow, Meditsina, 1984, 160 pp.

3. Klyachkin, L. M., Zorina, S. A., Ivanovskiy, G. I. and Savinov, V. A., "Rehabilitation Objectives of Chronic Bronchopulmonary Diseases," TERAPEVT. ARKH., No 3, 1985, pp 34-36.

4. Kanep, V. V., "Annual Clinical Examination and Treatment of the Population—At the Level of Modern Requirements," TERAPEVT. ARKH., No 1, 1987, pp 6-10.

5. Kolbasnikov, A. V., "Clinical Examination and Treatment of Hypertensive Patients in a Section Hospital," SOV. MEDITSINA, No 10, 1987, pp 56-57.

6. Kuzko, N. V., "Profilaktika i lecheniye ishemicheskoy bolezni serdtsa na vrachebnom uchastke" [Prevention and Treatment of Cardiac Ischemia in a Medical Section], Kiev, Zdorovya, 1985, 174 pp.

7. Kovalenko, V. N., Pidpalyy, G. P., Mikunis, I. I. et al., "Profilaktika i lecheniye serdechno-sosudistykh zabolevaniy u rabochikh zhivotnovodcheskikh kompleksov: Metod. rekomendatsii" [Prevention and Treatment of Cardiovascular Diseases in Workers of Livestock Raising Complexes: Methodological Recommendations], Dnepropetrovsk, 1986, 20 pp.

8. Kokosov, A. N., Molotkov, V. N., Ivanyuta, O. M. et al., "Khronicheskiye zabolevaniya legkikh" [Chronic Diseases of the Lungs], Kiev, Zdorovya, 1986, 200 pp.

9. Lipovetskiy, V. M., Shestov, D. B., Plavinskaya, S. I. et al., "Epidemiological Aspects of Cardiac Ischemia, Arterial Hypertension and Atherogenic Changes in Blood Lipid Composition in Men and Women of Leningrad 20-69 Years Old," TERAPEVT. ARKH., No 4, 1984, pp 44-48.

Oral Contraception Versus Abortion

927C0155A Moscow ZDOROVYE in Russian
No 4, Apr 91 pp 6-7

[Article by Doctor of Medical Sciences A. G. Khomasuridze, director, Human Reproduction Institute imeni I.F. Zhordani]

[Text] Our country has paid for many long years of refusing to give recognition to contraception with an enormous quantity of abortions. Unfortunately this fact became obvious to all a little too late. But literally in just the last 2 years actions undertaken by specialists—publicizing different aspects of family planning and importing contraceptives from abroad—caused the number of abortions to decrease by 400,000. This figure is of course not very impressive in comparison with the almost 6 million abortions that are still being performed, but it does show that the situation can be changed for the better.

I would now like to dwell in detail on hormonal contraceptives, inasmuch as they are thus far the most reliable. This is the opinion of many specialists, both ours and foreign. Practically 100 percent reliability is a very serious advantage of hormonal contraceptives over others.

I know that arguments against abortion are voiced rather often, including in the journal ZDOROVYE. Nonetheless I would like to once again repeat that many gynecological and endocrine diseases are caused precisely by artificial abortion. Spontaneous miscarriages and premature births occur significantly more frequently among women who resort to this method of terminating pregnancy; abortion is becoming one of the principal causes of infertility. Traumatic damage to the uterus, hemorrhaging and inflammatory processes are among the postoperative complications of abortion. And here is one other figure: According to scientists, mortality of infants born of women with artificial termination of pregnancy in their medical history is 1.5 times higher than for women who had not undergone an abortion.

Readers of ZDOROVYE have probably gotten used to hearing about the horrors of abortion, and I can clearly imagine the train of thought of most of our women: "This might happen to someone, but not to me. And therefore it would be better for me to have an abortion than constantly deal with the problem of contraception." Let me also add to this the traditional mistrust of hormonal drugs typical of women of our country.

According to WHO data 70 million women in different countries of the world, where the choice of methods of contraception is extremely wide and where barrier or intrauterine devices are not in short supply, are protected from pregnancy under a doctor's care precisely by means of oral contraception. Perhaps this fact may become a substantial argument in favor of oral contraception. Moreover a certain number of women employ oral contraception without medical supervision. They are also few in number, though it should be said that I am categorically opposed to such activity. I feel that only a physician specializing in gynecology and endocrinology can prescribe oral contraceptives. These contraceptives can and should be taken only under the care of a specialist.

The mechanism of action of oral contraceptives is suppression of ovulation—that is, maturation and release of an ovum from the ovary. This effect is reversible. That is, after a woman stops taking oral contraceptives, she may become pregnant if she wishes.

In my efforts to make oral contraception available, I encountered an opinion totally unexpected both to me and to many Soviet and foreign specialists—that hormonal

contraceptives could supposedly promote development of malignant tumors. Such reports appear from time to time in the mass media.

What is behind them? Incompetency, a thirst for sensationalism? It's hard to say. But many scientific studies by scientists in different countries categorically prove the reverse: Breast cancer and cancer of sex organs occur significantly more rarely in women who had taken oral contraceptives for a long time than in women who had never used such drugs.

Specialists here and abroad have been practically persuaded that sensible use of hormonal drugs with the goal of contraception simultaneously aids in treatment of dysfunctional uterine hemorrhaging, inflammatory diseases, endometriosis, fibrocystic mastopathy, ovarian cysts and even breast and uterine tumors. Doesn't this tip the scale in favor of oral contraceptives?

Many are frightened that in the first month or two, when a woman is just beginning to take hormonal contraceptives, she often feels poorly. Moreover her sensations recall a state characteristic of early pregnancy: weakness, sleepiness, excessive emotionality, and some gain in weight. Enlargement of the breasts and bloody discharges from the genital tract are possible as well. All symptoms are not clearly expressed, and they gradually disappear. But believe me, the unpleasantness that oral contraceptives cause is incomparable with the complications and unpleasantness that may be the consequences of an abortion.

All of this does not of course mean that oral contraceptives can be taken by absolutely everyone. Hormonal contraceptives are categorically contraindicated in the presence of hormonal tumors, acute diseases of the liver, gallbladder, kidneys and vessels, and in the presence of impaired blood clotting. Physicians prescribe them with great caution to epileptics and to patients with chronic diseases of the liver and bile ducts, thrombophlebitis, tuberculosis, migraine and chronic pyelonephritis in remission.

All hormonal contraceptives are tested in our institute. Therefore I would like to briefly describe the features of some of the most popular oral contraceptives, and offer additional information that can serve as reference points to those who are offered the choice or the possibility for bringing certain drugs from abroad. As we know, our country does not produce these contraceptives. For a long time it imported them from Hungary and the GDR. This year they have also been purchased in the FRG, the Netherlands, the USA and other countries—a total of 47 million packages of different drugs. Many of them are still unknown to our women.

Hungarian oral contraceptives—bisekurin, ovidon and rigevidon—and the German non-ovlon [transliterations] are combined contraceptives containing a constant dose of estrogen and gestagen hormones. Anteovin and triziston [transliterations] are in the group of sequential contraceptives, in which the quantity of estrogen and gestagen hormones is varied in steps depending on cyclic fluctuations of hormones in the woman's body. Use of these oral contraceptives stimulates a normal menstrual cycle in women, which makes it possible to minimize the risk of complications.

Last year our country purchased oral contraceptives from the FRG's Shering—trikvilar and diane [transliterations]. Trikvilar is a sequential contraceptive like triziston and diane, and it has practically no side effects on the woman's body. Diane contains cypreterone acetate, which possesses antiandrogenic activity, which is why it is especially indicated for women suffering hirsutism—excessive bodily and facial hair and seborrhea.

One other drug new to our country was registered quite recently— marvelon [transliteration], produced by Holland's Organon. The merit of marvelon is that it contains the estrogen component at a low dose, and dezogestrel [transliteration]—a highly active gestagen hormone of a new generation having minimum impact on metabolism.

Marvelon is not only a highly effective modern contraceptive; it possesses therapeutic action, and it is helpful against hirsutism and seborrhea.

The contraceptives demulen (USA) and lindiol (India) [transliterations] have also appeared in small quantities. They are prescribed primarily to women suffering a disturbed menstrual cycle, hemorrhaging and other gynecological disorders. These drugs are taken only by prescription, and under a physician's strict control.

As a rule, combined oral contraceptives are prescribed beginning on the fifth day of the cycle, irrespective of whether menstruation is still continuing by this day or not. They are taken until 2 days prior to the next anticipated menstruation. The dosage usually recommended is one tablet daily, at a time convenient to the woman. It is better to take it in the evening, because unpleasant sensations that may be caused by the side effects of the oral contraceptive will be less of a bother at night. The intervals between doses should not exceed 24 hours. But if you have suddenly forgotten to take a tablet in the evening, take one in the morning of the following day.

The days after completing a course of the oral contraceptive and prior to the onset of menstrual flow (usually 2-3 days) are said to be "safe" from the standpoint of possible pregnancy.

Now a few words about the so-called postcoital hormonal contraceptives. Such drugs are an effective and relatively safe means of preventing pregnancy in women living an irregular and, if I may, a casual sex life. Postcoital drugs may also be used in unforeseen situations: if for example a defect is discovered in a mechanical device (a male prophylactic, a diaphragm).

In our country the most effective postcoital drug is postinor [transliteration] (Hungary). The drug is taken in the hour immediately after sexual contact. If contact is repeated, a second tablet is recommended after 3 hours, and a third on the following day. This drug should not be taken more than once a week because of its high concentration of active gestagen.

Long-acting hormonal contraceptives are enjoying increasingly wider use abroad. They are practically unavailable in our country yet, but some, norplant for example, are already undergoing testing. The possibility is not excluded that after a certain while, women will be afforded the possibility for using this drug as well.

Norplant is implanted in capsule form beneath the woman's skin, and it maintains a contraceptive effect for 5 years.

Specialists are also aware of drugs which ensure sterility for 10-12 weeks after one-time parenteral administration. They include norethysterone enanthate, medroxyprogesterone acetate and noristerate. They are convenient when in view of some reasons—social, economic or ethnic—a woman is unable to take oral contraceptives. I think that after a certain while these drugs will also appear in our country. For the time being, I would want those oral contraceptives that are already available in our country, or soon will be, to find the way to users. The ice of mistrust toward this method of contraception must finally be broken.

Status and Current Problems of Improving Specialized Care for Burn Victims in RSFSR

927C0192A Moscow SOVETSKAYA MEDITSINA in Russian No 9, Sep 91 pp 3-5

[Leading article by V.V. Azolov, N.A. Ponomareva, V.A. Zhegalov, S.P. Pakhomov, and G.P. Shishulina, Nizhniy Novgorod Scientific Research Institute of Traumatology and Orthopedics]

UDC 617-001.17-082(470)

[Text]The first specialized burn departments were opened in the RSFSR in the 1960's. Figure 1 illustrates the rate of development of specialized care for burn victims.

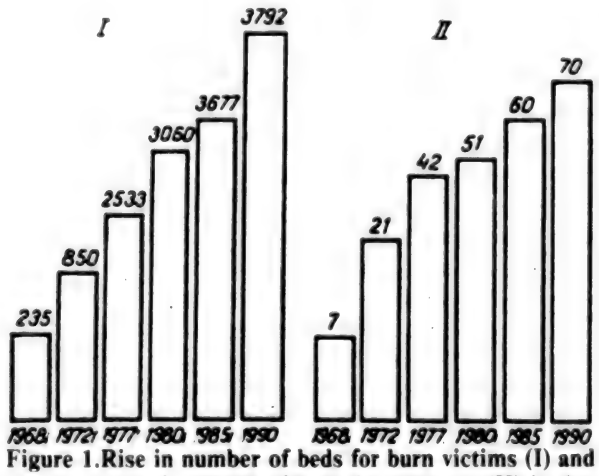


Figure 1.Rise in number of beds for burn victims (I) and development of network of burn departments (II) in the RSFSR

As of the start of 1991, there are 70 functional burn departments (3140 beds, including 792 for children) in the 69 territories of the Russian Federation (16 ASSR, 6 krays and 47 oblasts). In addition, there are specialized beds for burn victims at 84 hospitals, in their traumatology and surgical departments, in 72 cities and worker settlements. There are no burn beds in four oblasts: Ivanovo, Murmansk, Magadan, Sakhalin, and Buryat ASSR. There is a total of 3792 beds for treatment of victims of burns and their sequelae, including 966 for children. Availability of beds for burn victims in the republic constitutes 0.27 per 10,000 population.

Most burn departments (77.2 percent) are situated at multidiscipline hospitals, clinics of research and medical institutes, which permits rendering adequate treatment at all stages of burn disease with use of modern diagnostic and therapeutic methods.

There has been a rise in number of burn victims who received specialized care along with development of the network of burn departments: it constituted 6.1 percent since 1980, but almost 80 percent of the burn victims in this republic continue to receive treatment at nonspecialized hospitals. Most of them are cases of slight superficial and limited burns, and they can receive adequate care in surgical and traumatological departments; but 25-30 percent of all those hospitalized must be treated in specialized facilities. This is indicated by the fact that, of the total number of deaths due to burns in RSFSR hospitals, only one-third were treated in burn departments, while two-thirds were treated in nonspecialized ones. This indicates that burn departments are not active enough in admitting serious cases from nonspecialized hospitals.

Analysis of mortality rates in specialized departments covering the last 10 years revealed (Figure 2) that the incidence of fatal outcome among patients with deep burns dropped from 18.2 to 11.3 percent. This has affected the indicators of total mortality in the RSFSR as a whole among all hospitalized burn victims: it dropped to ten-twelfths (from 2.6 to 2.1 percent) in 1985-1989 as compared to 1980-1984; overall mortality in specialized departments over the same period dropped from 5.7 to 4.3 percent (i.e., to ten-thirteenths).

Investigation of the correlation between groups of patients admitted to burn departments in this republic failed to demonstrate a tendency toward rise in number of victims with deep burns; it ranged in different years from 25.3 to 35.4 percent. There is a high percentage (5.2 to 13.1) of patients in burn departments who did not belong there, and this is a real reserve for more active and purposeful transfer of patients with deep burns from nonspecialized hospitals to burn centers. There has been no appreciable increase in number of patients with sequelae of burns (it constitutes 4.5 to 9.1 percent). As before, most of them are treated at the Republic and All-Union burn centers.

The indicators of surgical activity (56) and operability (34.1) indicate that virtually all patients with deep burns and their sequelae are treated in burn departments by efficient methods, which cannot be said about the nonspecialized hospitals.

The most typical indicator of efficiency of specialized departments is the reduction in patient treatment time. This is confirmed by the plots in Figure 3, each of which

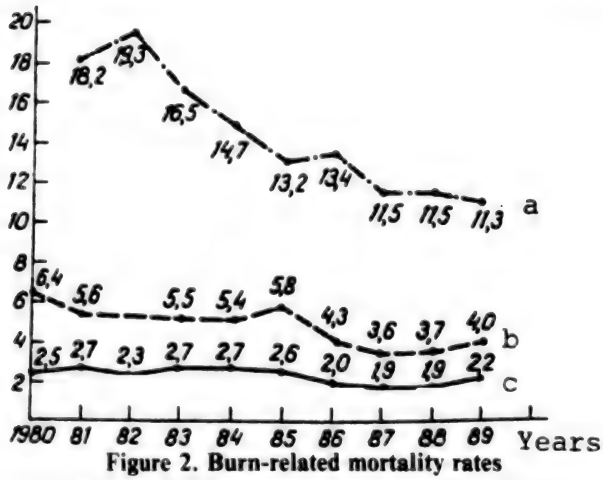


Figure 2. Burn-related mortality rates

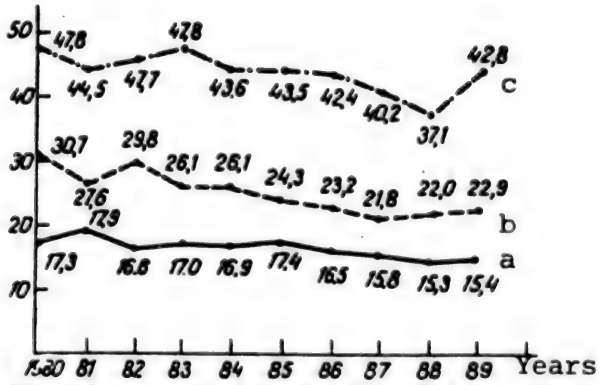


Figure 3. Dynamics of duration of hospital care of burn victims in RSFSR; y-axis—number of bed-days.

reflects the dynamics of treatment time for burn victims in the last decade: 1—in all hospitals (burn centers and nonspecialized) of RSFSR as a whole; 2—all burn victims in specialized departments; 3—only patients with deep burns in such departments. All three curves indicate that there is a decline in treatment time for burn victims: 1-2-day reduction in all hospitals of the republic (i.e., virtually 160,000 burn victims), decrease from 30.7 to 22.9 bed-days in burn centers, where approximately 30,000 patients are treated each year (see Figure 3, curve 2). There is no doubt that the reduction in duration of hospitalization is due primarily to more active treatment of patients with deep burns (see curve 3). Thus, the reduction constituted a mean of 5 bed days (from 47.8 to 42.8) since 1980. If, however, we were to compare the last five-year period (41.1 bed-days) to 1970-1975, when the specialized burn service was being formed, the reduction would constitute 17.8 days. Considering the fact that about 10,000 patients with deep burns are treated annually in specialized departments, the savings in bed-days in this republic under the 12th Five-Year Plan is 50,000 bed-days per year, as compared to the 11th, and their upkeep would constitute about 1 million rubles.

The reduction in treatment time and savings were achieved primarily as a result of adoption in specialized departments of the active surgical tactics elaborated at the Republic Burn Center, as well as of methods for speeding up scab sloughing by means of necrectomy and necrolytic agents, as a result of which first skin grafts could be performed sooner and intervals between repeated grafts were reduced. Use of technological advances, such as special Clinitron type beds, aerotherapeutic devices, infrared light, etc., were also instrumental in accomplishing this.

The Republic Burn Center is systematically carrying out investigations of the status of specialized care of burn victims in different regions of the RSFSR. On the basis of their findings, recommendations are offered for improving care of burn victims and developing the network of burn departments. In the last 10 years, the staff of this center made an average of 198 trips per year, for consultations or regularly scheduled visits, to 28 oblasts, ASSR's, and krays, during which they consulted 800 patients and performed 45 operations. In recent years, a survey was made of the care of burn victims in Kuybyshev, Novosibirsk, Kurgan, Sverdlovsk, Sakhalin, Magadan, Rostov, Chelyabinsk and other oblasts of RSFSR.

Personnel attend courses for advanced training of physicians at the All-Union and Republic burn centers (106 physicians annually) to man the burn departments with qualified staff.

Republic-level scientific-practical conferences are held every 4-5 years (in Saratov, 1981; Nizhniy Novgorod, 1986, 1991), and there are 1-2 annual visiting seminars dealing with pressing problems of burn treatment (Blagoveshchensk, Bryansk, Astrakhan, Yuzhno-Sakhalinsk, Yakutsk, Petropavlovsk-Kamchatskiy, Kazan, Naberezhnyye Chelny, Belgorod, Cheboksary, Nizhniy Novgorod, Kaluga),in order to advance the theoretical training of physicians and introduce research results to health care practice.

Research on the problem of "Burns" is being carried out continuously in RSFSR at 5 scientific research institutes (Nizhniy Novgorod Scientific Research Institute of Traumatology and Orthopedics, Moscow Scientific Research Institute of Emergency Care, Leningrad Pediatric Orthopedic Institute, Leningrad Scientific Research Institute of Hematology and Blood Transfusion, Moscow Scientific Research Institute of Pediatrics and Pediatric Surgery), as well as different departments of five medical institutes: Chelyabinsk, Vladivostok, Bashkir, Saratov and Smolensk institutes. They deal with pathogenesis of burn sickness, development of diagnostic, preventive and therapeutic methods for complications and serious sequelae of burns.

As a result of scientific research, a total of 9 doctoral and 41 candidatorial dissertations were defended, 9 collections of scientific papers were prepared and published; 5 educational aids, 17 methodological recommendations, a bibliographic guide (3d edition) on "Soviet Literature on Skin Plastic Surgery," 500 scientific articles, including 129 in the central press, were published over a 10-year period. On

the basis of research data, 23 applications were submitted for inventions, 14 author certificates and 99 certificates for optimization proposals were issued.

The most important achievements in the area of the Burn Sickness problem are: development of a system of medical rehabilitation of burn victims; "thermovision" and radiothermometric methods of differential diagnosis of burn depth; method of postmortem identification of burn shock; methods of treating deep burns of the chest in children; method of surgical management of burns to the head with damage to bones of the cranial vault; method of enhancing efficacy of skin autoplasty in cases of repeated autodermoplastic surgery; method of detecting endotoxemia in burn sickness; method of preventing and correcting renal functional disturbances at the acute stage of burn trauma; methods of surgical management of sequelae of burn trauma.

The high scientific potential of RSFSR institutions and developments on the level of worldwide innovations are instrumental in solving problems of thermal trauma; however, further development of treatment of burns ["combustiology"] is being delayed by substantial flaws in its organization.

In spite of the previously issued orders of the RSFSR Ministry of Health, the plan for deployment of burn departments has not been executed in several parts of RSFSR (Buryat ASSR, Novosibirsk, Vladimir, Murmansk, Arkhangelsk and Belgorod oblasts, Krasnodar and Khabarovsk krays); existing burn departments in Saransk, Groznyy and Chita have not been upgraded.

The results of a poll of burn department chiefs revealed that there is a high rate of turnover (25-50 percent), the causes of which are very intense work, increased infectious and allergic morbidity among personnel (sore throat, pharyngitis, pneumonia, myocarditis, dermatitis, etc.). Every third employee is sick several times a year. This is due to the fact that half the departments are in makeshift facilities which do not meet the standards for optimum area per burn victim bed (standard is 10-12 m^2, while the actual area is 3.5-5 m^2 per bed), as stipulated by the sanitary-hygienic specifications in order No 720 of the USSR Ministry of Health, according to which a burn department is equated to an infectious department with respect to working conditions.

There is an obvious shortage of financing for burn beds. Polling of a sample of burn departments and economic calculations of the finance service of the Republic Burn Center revealed that the cost per burn victim per bed is 20 rubles/day at the present time; in actuality, it costs 8000 to 20,000 rubles to treat one serious burn case, including all expenditures, depending on severity of trauma and duration of treatment.

The standards for organizational staff structure, drug supply and material-technical base of burn departments do not meet current specifications and require additional investigation, with due consideration of the differences between stages of medical care of burn victims.

We are quite concerned about the poor situation with regard to furnishing burn departments with medical equipment, surgical and special instruments, disposable syringes and systems for transfusion of blood and blood substitutes. For example, the need for dermatomes is being met to only 10 percent in recent years, and no equipment for perforation of skin grafts is being delivered to preventive medical institutions; requests for aerotherapeutic apparatus in different modifications are satisfied to 13 to 46 percent. The production of probes, equipment for parenteral feeding, and air-mattress beds of the Clinitron type has not been set up properly. There are interruptions in delivery of blood substitutes, protein products, oil emulsions, immune blood products, broad-spectrum antibiotics and antiseptics, water-soluble ointments, and hormones to burn departments in some administrative territories. The departments do not have a supply of these drugs in the event of group or mass-scale thermal trauma.

These data warrant the statement that the reserves for enhancing the efficacy of treatment of burn victims are far from being exhausted.

Opening thermal trauma departments in areas where none presently exist would improve specialized care of burn victims.

The efficacy of already existing departments must be improved by means of strict adherence to specialization of burn departments, appropriate use of specialized beds that are still being occupied by patients with other forms of pathology.

The unified system of dispensary care and rehabilitation of recovering burn victims, which is being adopted in the Russian Federation and is based on active prevention of serious sequelae of burn trauma, thus precluding repeated hospitalization and repeated surgical interventions, would reduce total treatment time and improve its quality.

It is imperative to strengthen the material and technical base of specialized departments, have them conform to sanitary and hygienic standards for burn victim upkeep, furnish them with modern equipment, drugs, special instruments, in particular, dermatomes, in order to improve the results of their work.

It is necessary to augment appreciably the financing of the burn service, as well as to add to the list of the USSR Ministry of Health the specialty of "plastic surgeon-burn specialist [combustiologist]," adding resuscitation and intensive care sections or stations with their own staff and medical equipment to the structure of burn departments and centers.

It is high time to raise the question of establishing a department of thermal burns at the Republic Burn Center of the RSFSR in Nizhniy Novgorod.

Hematological Data on Participants in Eradication of Sequelae of Accident at Chernobyl Nuclear Power Plant 3 Years After Working in Chernobyl

927C0192B Moscow LABORATORNOYE DELO in Russian No 8, Aug 91 pp 47-51

[Article by P.N. Lyubchenko, V.K. Bozhenko, V.G. Maslennikova, T.P. Karaseva, and Ye.B. Dubinina, MONIKI [Moscow Oblast Clinical Scientific Research Institute imeni M.F. Vladimirskiy, and Moscow Roentgen-oradiological Scientific Research Institute, under the rubric "Hematology"]

UDC 616.15-02:614.876]-074

[Text]In the opinion of many authors [2, 4, 7], ionizing radiation in doses of less than 0.5 Gy does not elicit radiation lesions. However, there is also much evidence of changes in functional properties of the body, in particular functional and morphological parameters of blood cells under the effect of low doses of radiation [3, 8, 9].

The permissible level of radiation was set at 0.25 Gy (25 rem), which corresponds to a 5-year radiation dose for professionals, for individuals from different parts of the country, including Moscow Oblast, who were assigned to eradicate the consequences of the Chernobyl accident. Blood tests carried out on them at MONIKI in the early months after returning from Chernobyl revealed a tendency toward thrombocytosis and erythrocytosis in a few cases (16 percent) [5, 6]. Using the acid erythrogram method, the authors discovered an increase in most subjects in highly resistant and markedly resistant populations of red blood cells, which enabled them to expound the hypothesis that there is an increase in number of juvenile erythrocytes in the blood of this group. There was also a change in shape of red cells: appearance of stomatocytes in a considerable number of subjects.

No changes in tests of erythrocyte stability were noted in subsequent publications of other authors, who used laser cytofluorometry.

Our objective here was to carry out an in-depth investigation of hematological parameters of participants in the eradication of sequelae of the Chernobyl accident using an automatic H-1 analyzer of the Technicon firm an average of 2 years and in most cases 3 years after working in Chernobyl. The system of the H-1 automatic analyzer permits differentiated analysis of all blood cells, including information about their size, peroxidase activity, optical density and nucleus dimensions.

We screened 31 participants of eradication of sequelae of the Chernobyl accident; the subjects ranged in age from 20 to 46 years (mean 38.2 years). Virtually all of them had worked at the plant in 1986. A control group consisted of essentially healthy employees of the Moscow Roentgenoradiological Scientific Research Institute (21 people; mean age 41.5 years) who had no professional contact with ionizing radiation.

The individual doses in participants in eradication of the accident sequelae recorded on military cards ranged from 2.5 to 36.5 rad (mean 18+/-1.6 rad). Clinical screening failed to reveal any symptoms typical of radiation exposure. Digestive organ pathology was found in 15 people, including chronic gastritis in 14 (erosive in 3 cases). Vegetovascular dystonia of the cardiac type was found in five patients; there were 1-2 cases each of Hashimoto's struma and lung disease (chronic bronchitis without exacerbation).

Table 1 lists the hematological data on participants in eradication of the Chernobyl accident and control group of subjects. The data indicate that most of the hematological parameters were within the range of physiological fluctuations in all cases.

Table 1. Hematological parameters of participants in eradication of Chernobyl accident sequelae after 20 months

Parameter	Normal	Participants in accident eradication		Control group	
		X	+/-m	X	+/-m
Erythrocytes, x1000/μl	4.2-6.1	4.12	0.124*	4.63	0.063
Hemoglobin, gram-percent	12.0-18.0	13.30	0.334	13.70	0.287
Hematocrit, percent	37-52.0	40.80	0.798	39.00	0.559
Mean red cell volume, fl	80-99.0	98.90	1.360*	84.10	0.755
Hemoglobin in erythrocyte, pg	27.0-31.0	32.00	0.330*	30.50	0.395
Mean hemoglobin concentration in erythrocyte, gram-percent	33.0-37.0	32.50	0.310*	35.80	0.390
Leukocytes, x1000/μl	4.8-10.8	7.72	0.430*	5.60	0.280
Neutrophils, percent	40.0-74.0	54.20	1.590	59.60	1.560
Lymphocytes, percent	19.0-48.0	32.80	1.570	29.50	1.570
Monocytes, percent	3.4-9.0	6.75	0.304	6.14	0.445
Eosinophils, percent	0.0-7.0	3.30	0.434	2.30	0.255
Basophils, percent	0.0-1.5	0.97	0.077	0.87	0.108
Undifferentiated cells, percent	0.0-4.0	1.85	0.131	1.59	0.186

Table 1. Hematological parameters of participants in eradication of Chernobyl accident sequelae after 20 months (Continued)

Parameter	Normal	Participants in accident eradication		Control group	
		X	+/-m	X	+/-m
Neutrophils, x1000/μl	1.9-8.0	4.36	0.486	3.38	0.229
Lymphocytes, x1000/μl	0.9-5.2	2.18	0.102	1.60	0.084
Monocytes, x1000/μl	0.16.0-1.0	0.48	0.029	0.35	0.032
Eosinophils, x1000/μl	0.0-0 8	0.21	0.027	0.13	0.015
Basophils, x1000/μl	0.0-0.2	0.10	0.029	0.05	0.005
Undifferentiated cells, x1000/μl	0.0-0.4	0.13	0.012	0.09	0.010
Thrombocytes, x1000/μl	130.0-400.0	262.10	10.000	307.70	20.400
Mean thrombocyte volume, fl	7.2-11.1	9.00	0.125	8.90	0.220
Peroxidase index, standard units	-10.0 to +10.0	-0.76	0.996	-0.88	1.280
Leukocyte index, standard units	1.9-3.0	1.96	0.040	1.83	0.066

Footnote: *Reliable difference from control, $p<0.05$.

However, there are a few parameters that warrant referral to some tendencies toward change in hematological characteristics of eradication workers. We were impressed by the reliable decrease in number of red blood cells, increase in erythrocyte volume and hemoglobin content of red cells (in absolute terms), decline of the parameter characterizing mean hemoglobin concentration per 100 ml in relation to hematocrit multiplied by 100; see Figure). These findings enable us to refer to disturbances in the peripheral part of the erythron, perhaps due to membrane changes.

White blood cell parameters also demonstrated a definite pattern, although they were within the normal range. As compared to the control group there was a reliable increase in leukocyte count. The increase is attributable to virtually all types of blood cells, which is apparent from the coinciding percentages in the blood formula.

Table 2 lists some functional and morphological characteristics of leukocytes determined with the H-1 Technicon analyzer. In participants in eradication of the accident sequelae there are several reliably different parameters. As compared to the control group, they demonstrated an increase in number of large undifferentiated cells, apparently atypical lymphocytes.[1] This is consistent with the changes in diameter and optical density of nuclei of mononuclears and polynuclears. These changes may be interpreted as intensification of regenerative processes in bone marrow. Peroxidase activity was unchanged in all cells.

Erythrocyte volume and mean hemoglobin concentration in erythrocytes of participants in eradication of accident sequelae and control group of subjects

1) participants; 2) control group; x-axis—erythrocyte volume (in fl [expansion unknown]; y-axis—erythrocyte hemoglobin concentration (g/100 ml)

Table 2. Parameters of peroxidase activity and optical density of leukocyte nuclei in participants in eradication of Chernobyl sequelae

Parameter	Participants in eradication of accident sequelae	Control
	X+/-m	X+/-m
Neutrophils—peroxidase activity, standard units	28.2+/-0.27	28.2+/-0.27
—cell diameter, standard units	35.8+/-0.12	35.5+/-0.14
Lymphocytes—peroxidase activity, standard units	2.22+/-0.04	2.33+/-0.06
—cell diameter, standard units	14.60+/-0.12	14/90+/-0.14
Monocytes—peroxidase activity, standard units	14.50+/-0.30	15.50+/-0.50
—cell diameter, standard units	27.20+/-0.24	27.7+/-0.28
Eosinophils—peroxidase activity, standard units	36.90-0.34	36.5-0.41
—cell diameter, standard units	14.99+/-0.11*	16.40+/-0.45
Nuclei of mononuclear cluster—optical density, standard units	11.70+/-0.15*	13.60+/-0.36
—diameter, standard units	13.60+/-0.73	12.90+/-1.02
Optical density of nuclei of polymorphonuclear leukocyte cluster, standard units	24.20+/-0.55*	20.90+/-1.02
Large undifferentiated cells, percent	2.07+/-0.20*	0.79+/-0.20
Polymorphonuclear neutrophils, percent	55.90+/-1.97*	67.40+/-2.40
Mononuclears, percent	42.80+/-1.97	33.00+/-1.74

Footnote: *Reliable difference from control, $p<0.05$.

Individual analysis of parameters failed to demonstrate a relationship to existing somatic pathology. In order to determine the relationship to exposure dose, we calculated the coefficients of correlation between hematological parameters and dose. Table 3 lists only significant coefficients of correlation.

Table 3. Coefficients of correlation between hematological parameters and radiation exposure dose in participants in eradication of Chernobyl accident sequelae

Parameter	Coefficient of correlation	Level of significance
Percentage of neutrophils	+0.36	0.12
Percentage of lymphocytes	-0.30	0.20
Percentage of basophils	-0.34	0.14
Optical density of mononuclear nuclei	-0.39	0.15
Diameter of mononuclear nuclei	+0.51	0.05
Percentage of polymorphonuclear neutrophils	+0.34	0.21

According to the data in Table 3, with increase in dose there is increase in number of polymorphonuclear neutrophils, decrease in number of lymphocytes and basophils; there is increase in size of nuclei and change in their optical density in mononuclears.

Thus, examination of peripheral blood of participants in eradication of the sequelae of the Chernobyl accident 3 years after working in Chernobyl, using the H-1 hematological analyzer, revealed a number of changes in red and white blood cells: increase in red cell volume, number of undifferentiated cells, change in size of nuclei and their optical density in eosinophils, neutrophils and lymphocytes. We can concur with I. G. Akoyev and N. N. Motlokh [1] that "the absence of changes in cytological composition of blood should not serve as proof of really normal hemopoiesis." In the course of dispensary care of participants in eradication of sequelae of the accident at the Chernobyl Nuclear Power Plant, it is desirable to carry out an in-depth study of the blood at the long term, preferable with use of an automatic analyzer, for example of the Technicon type, at an oblast hospital. Individuals presenting with functional and morphological changes in red or white blood cells must be placed in a high-risk group. If changes progress, patients should be referred for examination to specialized hematological or radiological clinics.

References

1. Akoyev, I. G., and Motlokh, N. N., "Biofizicheskiy analiz predpatologicheskikh i predleykoznykh sostoyaniy" [Biophysical Analysis of Prepathological and Preleukemic States], Moscow, 1984.

2. Vladimirov, V. G., VOYEN.-MED. ZHURN., 1989, No 4, pp 44-46.

3. Ivanov, V. V., and Streltsova, V. N., RADIOBIOLOGIYA, 1985, Vol 25, No 3, pp 372-375.

4. Moskalev, Yu. I., and Streltsova, V. N., VOPR. ONKOL., 1985, Vol 31, No 11, pp 3-10.

5. Plaksina, G. V., Teodor, I. L., Kvitko, N. N., et al., "Sovremennyye problemy professionalnoy patologii" [Current Problems of Occupational Pathology], Moscow, 1989, pp 115-118.

6. Plaksina, G. V., Teodor, I. L., Talalayeva, T. G., et al., "Adaptatsiya i dezadaptatsiya v patologii" [Adaptation and Deadaptation in Pathology], Moscow, 1989, pp 132-135.

7. Ramzayev, P. V., "Meditsinskiye aspekty avarii na Chernobylskoy AES" [Medical Aspects of the Accident at the Chernobyl Nuclear Power Plant], Kiev, 1988, p 185.

8. Shubik, V. M., "Immunologicheskiye issledovaniya v radiatsionnoy gigiyene" [Immunological Studies in Radiation Hygiene], Moscow, 1987.

9. Kubasova, T., Koteles, G. J., and Varga, L. P., INT. J. RADIAT. BIOL., 1981, Vol 40, No 2, pp 187-194.

Child Morbidity in Rural Moldova

927C0193A Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 8, Aug 91 pp 34-38

[Article by K.P. Yetsko, Ye.P. Popushoy, M.M. Rayevskiy, and N.Ye. Iodko, Kishinev Medical Institute imeni N. Testemitsanu]

616-053.2:312.6(478-22)

[Text]Among the parameters characterizing health status of the public, morbidity acquires prime significance, along with physical development and demographic indicators. The morbidity rate (MR) among the population, including children, depends on availability of seeking medical care. In turn, the possibility of seeking medical care depends on existing forms of organization.

Let us also mention the fact that the real MR that can be obtained by submitting it to a comprehensive study, i.e., on the basis of frequency of medical visits and physical examinations, not only allows physicians to decide on the content of preventive work and campaigning for a healthy life style, but to determine reliable standards of public requirements as to different types of medical care. Moldova is one of the most densely populated regions of the nation, where about 60 percent of the population reside in rural areas. However, to date the health status of children and, in particular, morbidity among them have been little-studied.

Proceeding from the foregoing, a special investigation was carried out in order to determine the MR and structure of childhood morbidity in five rural rayons, which was aimed at studying public morbidity on the basis of medical visits and comprehensive physical examinations.

Morbidity according to visits paid was studied on the basis of data extracted from medical records at all stages of public requests for medical attention (SVA [expansion unknown], database management systems, CRH [central rayon hospitals], and republic institutions) that were entered on cards that we developed especially for this purpose. In addition, in-depth, comprehensive examinations were performed by CRH specialists. The mean number of children submitted to examination over a 3-year period was 7434, or 27.4 percent of all those examined, which conforms to the share of children in the general population.

The results of these studies revealed that mean MR (according to frequency of seeking medical attention over a 3-year period was 474.2 cases/1000 children, the figures being 487.6/1000 for boys and 460.5/1000 for girls (Table 1).

Table 1. Morbidity according to medical visits paid by children of rural Moldova (per 1000 children)

Class of diseases	Age, years														
	0-1			1-3			3-7			7-14			0-14		
	B	G	Both	B	G	Both	B	G	Both	B	G	Both	B	G	Both
I Infectious and parasitic diseases	32.4	44.2	38.1	67.5	49.9	58.6	91.9	70.3	81.2	49.3	48.5	48.9	62.5	54.2	58.3
III Endocrine system diseases, nutritional, metabolic and immunity disorders	81.0	128.3	103.6	18.8	21.2	20.0	2.0	—	1.0	1.5	—	0.8	9.6	11.3	10.4
VI. Nervous system and sense organ diseases	64.8	101.8	82.5	34.5	37.8	36.2	31.3	37.1	34.2	21.4	24.0	22.7	28.9	34.5	31.7
VIII Respiratory organ diseases	259.1	300.5	279.1	406.6	379.7	392.9	374.4	345.4	360.1	118.5	117.4	117.9	242.8	233.7	238.1
IX Digestive organ diseases	64.8	53.1	59.2	37.7	36.3	37.0	22.1	24.1	23.3	33.0	34.4	33.7	33.0	33.2	33.1
XII Skin and subcutaneous tissue diseases	76.9	88.5	82.5	69.1	[illegible]	5	76.2	58.2	67.4	19.8	19.3	19.6	46.5	37.6	42.1
XVII. Accidents, trauma and poisoning	64.8	66.4	65.5	39.2	[illegible]	8	42.0	23.1	32.7	33.0	18.3	25.4	38.5	25.5	32.1
Other diseases	56.7	185.8	142.9	29.8	21	25.4	25.4	8.0	16.8	21.9	26.1	23.9	26.3	30.5	28.4
—Totals	700.4	969.0	828.8	703.3	624.8	663.2	665.7	568.3	617.6	298.4	287.9	293.2	487.6	460.5	474.2

Note: Here and in Tables 2 and 3: B—boys; G—girls, Both—both sexes

If we compare our figures for MR (according to frequency of medical visits) for children of rural Moldova to the data of other authors, it is apparent that it is considerably lower than in other parts of the country. For example, according to T. K. Kalzhekov et al. (1978), in Kazakhstan it constituted 971.0/1000 and according to P. P. Petrov et al. (1990) it was 965.94/1000.

As to the different classes of diseases among the child population, respiratory diseases are in first place—238.1/1000, followed by infectious and parasitic diseases—58.3/1000, diseases of subcutaneous fatty tissue and skin—42.1/1000, digestive organs—33.1/1000, nervous system and sense organs—31.7/1000, accidents, trauma and poisoning—32.1/1000.

Upon examination of the obtained MR according to frequency of medical visits for different age groups, we established that maximum MR is among children in the first year of life, averaging 828.8 cases per 1000 children. It should be stressed that the MR for boys (700.4/1000) is appreciably lower than for girls (969.0/1000). Diseases of digestive organs (279.1/1000), endocrine system, nutritional and metabolic disorders (103.6/1000), diseases of the nervous system and sense organs (82.5/1000), skin and subcutaneous tissue (82.5/1000) are the most typical of infants in the first year of life.

We must note that relatively high MR for children 1 to 3 years of age (663.2/1000). It is among them that we find the highest incidence of respiratory diseases (392.9/1000). Infectious and parasitic diseases are in second place (58.6/1000), skin and subcutaneous fatty tissue diseases are in third (55.5/1000), and digestive organ diseases are in fourth place (37.0/1000).

Mean MR for children 3 to 7 years of age is 617.6 cases per 1000. Digestive organ diseases are also in first place (360.1/1000). They are followed by infectious and parasitic diseases (81.2/1000), diseases of the skin and subcutaneous tissue (67.4/1000), diseases of the nervous system and sense organs (34.2/1000), trauma and poisoning (32.7/1000).

The lowest MR according to frequency of seeking medical attention is referable to children 7 to 14 years of age, and it constitutes 293.2/1000. MR is somewhat lower among girls than among boys, 287.9 and 298.4/1000, respectively.

In this group of children, 117.9 cases per 1000 are referable to the class of respiratory diseases. Infectious and parasitic diseases are in second place—48.9/1000. Digestive organ diseases are in third place (33.7/1000), trauma and poisoning in fourth (25.4/1000), nervous system and sense organ diseases are in fifth place (22.7/1000).

In-depth medical examination of children revealed an additional 973.6 cases per 1000 examined of previously unknown disease. T. K. Kalzhekov et al. obtained indicators on the level of 297.9/1000 [1], while P. P. Petrov et al. cited 331.74/1000 [3], which is one-third of our figure. These parameters were about the same for boys and girls, constituting 975.8 and 971.4/1000 (Table 2). Highest morbidity rates according to special examinations were found for children 7-14 years old (1154.4/1000), with a higher figure for girls (1185.4/1000) than for boys (1122.7/1000); the group of children 3-6 years of age were in second place, there being considerable differences in this indictor between boys (1057.9/1000) and girls (956.0/1000); the group of children 1 to 3 years of age was in third place. In this case, additional morbidity constituted 398.0/1000, the figures being 464.3/1000 for boys and 336.5/1000 for girls. The lowest figure (369.4/1000) was noted for the group of infants under 1 year old, without any particular differences between girls and boys.

Table 2. Morbidity according to results of physical examination of children in rural Moldova (per 1000 children)

Class of diseases	Age, years														
	0-1		1-3		3-7		7-14		0-14						
	B	G	Both	B	G	Both	B	G	Both	B	G	Both	B	G	Both
I. Infectious and parasitic diseases	21.0	8.0	14.9	10.2	9.5	9.8	16.5	4.6	10.9	18.1	14.8	16.4	17.1	11.2	14.2
III Endocrine system diseases, nutritional, metabolic and immunity disorders	69.9	64.0	67.2	5.1	—	2.5	--	2.3	1.1	5.0	10.8	8.0	8.8	11.2	10.0
VI. Nervous system and sense organ diseases	35.0	24.0	29.9	25.5	23.7	24.6	39.3	37.0	38.2	41.2	64.1	52.8	38.5	49.9	44.2
VIII. Respiratory organ diseases	97.9	104.0	100.7	96.9	109.0	103.2	140.5	118.1	129.9	102.6	129.2	116.0	111.7	122.3	117.0
IX. Digestive organ diseases	62.9	40.0	52.2	209.2	142.2	174.6	756.2	689.8	724.9	849.1	876.7	863.0	693.5	685.7	689.6
XII Skin and subcutaneous tissue diseases	21.0	24.0	22.4	40.8	23.7	31.9	14.5	25.5	19.7	32.2	17.8	24.9	27.5	20.8	24.2
XIV. Congenital abnormalities	21.0	16.0	18.7	20.4	4.7	12.3	10.3	6.9	8.7	4.0	6.9	5.5	8.8	7.3	8.1
XVII. Accidents, trauma and poisoning	21.0	56.0	37.3	15.3	4.7	9.8	10.3	4.6	7.6	6.0	2.0	4.0	9.4	6.7	8.1
Other diseases	27.8	24.0	26.1	40.8	20.0	29.5	66.1	67.1	66.6	64.4	63.1	63.7	60.5	56.1	58.3
—Totals	377.6	360.0	369.4	464.3	336.5	398.0	057.9	956.0	009.8	122.7	185.4	154.4	975.8	971.4	973.6

Among the additional cases of disease that were picked up among rural children, diseases of digestive (689.6/1000) and respiratory organs (117.0/1000) were the most prominent, accounting for 82.8 percent of the cases. They are followed by diseases of the nervous system and sense organs (44.2/1000), skin and subcutaneous fatty tissue (24.2/1000), infectious and parasitic diseases (14.2/1000).

The data in Table 2 also indicate that there is the same ranking of classes of diseases, but with different levels thereof, in all age groups with the exception of infants up to 1 year old. The structure of morbidity detected upon physical examination of infants in the first year of life was characterized by the fact that diseases of respiratory organs constitute the main class (100.7/1000), followed by diseases of the endocrine system nutritional and metabolic disorders (67.2/1000), diseases of digestive organs (52.5/1000), accidents, poisoning and trauma (37.3/1000), diseases of the nervous system and sense organs (29.9/1000), etc. In the next age groups, MR for digestive organ diseases moves to first place, this indicator increasing by more than 3 times for the 1-3-year group and 16 times for children 7-14 years of age. The incidence of respiratory diseases, which remains at approximately the same level as in infants up to 1 year old, is in second place. Diseases of the nervous system and sense organs are in third place among children over 1 year of age.

There was a significant number of additionally detected chronic diseases, first of all diseases of digestive, respiratory organs, nervous system and sense organs, skin and subcutaneous tissue, which warrants the assumption that there are definite flaws in the performance of rural medical offices with respect to therapeutic and, particularly, preventive work with children. Apparently, medical offices are also understaffed with physicians.

The true or exhaustive morbidity among children is listed in Table 3. The overall level was 1447.8/1000, with 1454.4/1000 for boys and 1431.9/1000 for girls. Our figures are higher than those obtained by T. K. Kalzhikov et al. (1262.4/1000) [2], as well as P. P. Petrov et al.—1316.3/1000 [3], and they are lower than those of Ye. Ya. Titova and L. Ya. Oberg—2724.8/1000 [4].

Table 3. Real, or exhaustive morbidity of children in rural Moldova according to classes of diseases (per 1000 children of the same sex)

Class of diseases	B	G	Both
I. Infectious and parasitic diseases	79.6	65.4	72.5
II. Neoplasms	6.2	8.4	7.2
III Endocrine system diseases, nutritional, metabolic and immunity disorders	18.4	22.5	20.4
IV. Blood and hemopoietic organ diseases	14.0	13.4	13.7
V. Mental disorders	27.6	26.2	26.9
VI. Nervous system and sense organ diseases	67.4	84.4	75.9
VII. Circulatory system diseases	4.2	7.9	6.0
VIII. Respiratory organ diseases	354.1	356.0	355.1
IX. Digestive organ diseases	726.5	718.9	722.7
X. Genitourinary system diseases	13.6	9.0	11.4
XI. Complications of pregnancy, parturition and postpartum period	4.1	2.2	3.1
XII. Skin and subcutaneous tissue diseases	74.0	58.4	66.3
XIII. Musculoskeletal system and connective tissue diseases	5.9	7.6	6.7
XIV. Congenital abnormalities	11.1	9.4	10.3
XV. Different states occurring in perinatal period	2.7	6.1	4.4
XVI. Symptoms, signs and vaguely described states	8.1	5.0	6.6
XVII. Accidents, trauma and poisoning	47.9	32.2	40.2
—Totals	1454.4	1431.9	1447.8

In the structure of exhaustive morbidity among rural children, digestive organ diseases are in first place (722.7/1000), with a somewhat higher indicator for boys; respiratory diseases are in second place (355.1/1000), with the same indicators for boys and girls; diseases of the nervous system and sense organs are in third place (75.9/1000). There are some differences in this indicator between boys and girls (67.4 and 84.4/1000, respectively). Infectious and parasitic diseases are in fourth place (72.5/1000), the figure being higher for boys (79.6/1000) than girls (65.4/1000). Diseases of the skin and subcutaneous tissue (66.3/1000), accidents, poisoning and trauma (40.2/1000) are in fifth and sixth places, with a higher figure for boys.

In comparing the data in Tables 2 and 3, it should be noted that the structure of exhaustive morbidity is the same as the structure of morbidity according to the special medical examination.

In conclusion, it should be emphasized that these data on rural Moldova enable us to report a low child MR according to frequency of seeking medical attention and a higher level of diseases detected upon medical examination, as compared to other regions of the country. This is apparently attributable to the relative inaccessibility to rural children of appropriate medical, as well as specialized outpatient-polyclinic care, in the regions of their residence, in contrast to urban children. To eliminate these problems, there are plans to render outpatient-polyclinic services to the rural population by building a broad network of medical offices in villages of this republic (and for this purpose some category 4 plans have been drafted) and having narrow specialists travel in accordance with a special schedule once or twice a week in order to care for the sick in the area of their residence. These steps were proposed by the staff of the department of social hygiene and health care organization of the Kishinev Medical Institute. They will make it possible to gradually eliminate the existing differences in levels of rendering this type of medical services to the rural and urban population, and improve the health status of rural workers.

References

1. Kalzhekov, T. K., Shyngysova, F. S., and Kalzhigitov, Kh. I., "Aktualnyye problemy sotsialnoy gigiyeny i organizatsii zdravookhraneniya" [Pressing Problems of social Hygiene and Health Care Organization], Alma-Ata, 1978, pp 28-36.

2. Kalzhekov, T. K., Zhakatov, N. Zh., Inerbayeva, G. S., and Ospanova, S. Ya., "Zdravookhraneniye i zdorovye selskogo naseleniya" [Health Care and Health Status of the rural Population], Alma-Ata, 1987, pp 85-88.

3. Petrov, P. P., Kasymova, G. P., and Kalzhekov, T. K., SOV. ZDRAVOOKHR., 1989, No 8, pp 21-25.

4. Titova, Ye. Ya., and Oberg, L. Ya., Ibid, 1990, No 5, pp 38-40.

Simultaneous Measurement of All of Operator's Psychophysiological Characteristics in Tracking Mode

927C0054A Moscow MEDITSINSKAYA TEKHNIKA in Russian No 2, Mar-Apr 91 pp 3-5

[Article by N.V. Yakovleva, K.A. Lisitsyna, and Yu.G. Korshunov, Moscow Medical Academy imeni I.M. Sechenov]

UDC 613.6:[62-51/.59:612.821.1/.3.087

[Abstract] The proposed technique measures occupationally significant psychophysiological functions in operators during a tracking mode: emotional stress level, emotional stability level, emergency response preparedness, and occupational fitness. This technique is implemented by simulating the process of tracking dynamic objects on a television screen with changes in temporal parameters. Light or sound signals at preset moments in time are used to indicate an emergency. This technique measures tracking characteristics, response time, pulse, and cutaneous-galvanic reaction in subjects to determine their overall occupational suitability. Figures 2.

Multifunctional Apparatus "Multipsychometer-01" for Mass Psychodiagnostic Screening

927C0054C Moscow MEDITSINSKAYA TEKHNIKA in Russian No 2, Mar-Apr 91 pp 29-32

[Article by K. V. Sugonyayev, Moscow]

UDC 615.471.03:616.89-072.8

[Abstract] The authors describe the novel Multipsychometer-01, equipment which was developed in an attempt to solve the numerous problems of developing psychodiagnostic equipment, to evaluate occupational fitness. The basic drawback of current devices and complexes is the orientation to individual examination and resultant low carrying capacity. The Multipsychometer-01 is designed for the multi-parameter evaluation of the developmental level of occupationally significant operator skills and psychophysiological properties and parameters of the human functional status. The complex consists of a control desk, which programs test parameters and stores up to eight random test programs and calculates test results and results for given indexes, and a test desk, which formulates and presents test signals, records and evaluates the subject's response, and stores and retrieves test results. The variety of tests makes possible the complex evaluation of a person as part of a human-equipment system. The battery of tests used with the complex covers the characteristics of individuality related to the level of nervous system properties, psychomotor systems, cognitive mental processes, etc. The Multipsychometer-01 calculates 16 different indexes, including average, minimum, and maximum reaction time, to evaluate the speed and accuracy of performance of the entire test as well as individual sections. It has a mass of less than 23 kg and is recommended for solving a variety of applied problems. Figures 1; references 12: 10 Russian, 2 Western.

Psychomat Computer Equipment for Psychophysiological Examinations

927C0054D Moscow MEDITSINSKAYA TEKHNIKA in Russian No 2, Mar-Apr 91 pp 39-41

[Article by Ye.V. Matveyev, D.S. Nadezhdin, A.I. Shemsudov, and A.V. Kalinin, All-Union Scientific Research Institute of Medical Engineering, Moscow]

UDC 615.472:681.31/.03:616.89-008.1-073+612.828.1.08

[Abstract] This article discusses the basic results of the development of the KPFK-99 Psychomat computer complex for automation of psychophysiological investigations of human higher nervous activity. The main technical concept of the complex is the combination of flexible and universal calculating and monitoring capacities of the personal computer with problem-oriented specialized resources for presenting stimuli and recording responses. The complex consists of two work areas for the specialist and subject. The subject's work site has two desks for presenting the stimuli and recording responses. This makes possible the practically limitless list of experimental psychological and psychophysiological methods for researching higher nervous activity in man. All of the software programs are written in BASIC, but before full-scale production begins, the programs must be made compatible with personal computers, video terminals, disk drives, and printers. The complex is simple and easy to use, does not require specially training, and offers a new approach to harnessing computer technology to solve the scientific and practical problems of researching both normal and pathological human higher nervous activity characteristics. Figures 2; references 5 (Russian).

Number, Ultrastructure, and Ultracytochemistry of Neutrophils From Blood of People Exposed to Low Radiation Doses During Clean-Up of Chernobyl

927C0034B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 318 No 3, May 91 pp 760-762

[Article by K.P. Zak, V.V. Afanasyeva, I.M. Grinchenko, S.I. Chernyak, and S.V. Komissarenko, Kiev Scientific Research Institute of Endocrinology and Metabolism; Biochemistry Institute imeni A.V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

UDC 616.155.34:611.018.5:612.014.482

[Abstract] The number, ultrastructure, submicroscopic topography, and acid phosphatase activity of neutrophils from healthy men with normal blood composition aged 21 to 39 years who were involved in the clean-up at Chernobyl were investigated. Blood samples were drawn before entering the contaminated area, immediately after exposure to less than 25 REM over a 25-30 day period, and 1 year later. The results demonstrated that the neutrophil counts for the periods in question did not significantly differ from one another. However, with respect to the submicroscopic structure, there was an increase in the number of pinocytosis vacuoles, swelling, crumbling, clarification of the matrix, and deformation of granules, indicative of problems with pinocytosis and an increase in degranulation and exocytosis. In addition, acid phosphatase activity in the neutrophils immediately following work in the contaminated area was diminished. One year later the neutrophils exhibited more signs of exocytosis and degranulation. These submicroscopic changes in the neutrophils undoubtedly indicate damage to neutrophil production in the bone marrow. In conclusion, the results show that chronic radiation causes persistent changes in the submicroscopic organization and function of circulating neutrophils. References 4: 2 Russian, 2 Western.

Investigation of Removal of $^{134, 137}$Cs From Corned Meat

927C0034C Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 318 No 3, May 91 pp 763-765

[Article by A.I. Ilyenko and T.P. Krapivko, Institute of Evolutionary Morphology and Ecology of Animals imeni A.N. Severtsov, USSR Academy of Sciences, Moscow]

UDC 581.5

[Abstract] Corned meat was prepared from wild pigs (*Sus scrofa*) from Cherikovskiy Rayon, Mogilevskaya Oblast, Belorussian SSR, which were contaminated with $^{134, 137}$Cs as a result of fallout from the accident at Chernobyl. One month after the meat is initially prepared it is ready for consumption, and by this time 30 percent of the radionuclides have moved into the brine. The rest of the $^{134, 137}$Cs in the corned meat can be extracted by soaking the wet or dried corned meat in cold tap water for 24 hours and changing the water every 3 hours. The results demonstrated that the radionuclides are more completely and quickly extracted when using smaller pieces of meat. Figures 1; tables 2; references 3 (Russian).

Investigation of Sequelae of Chernobyl Nuclear Power Plant Accident—Fifth Anniversary of the Chernobyl Accident

927C0062A Moscow RADIOBIOLOGIYA in Russian Vol 31 No 2, Mar-Apr 91 pp 163-166

[Article by D. M. Grodzinskiy]

[Text]Five years have passsd since the fatal day of the accident in the fourth power unit of the Chernobyl Nuclear Power Plant. This accident is the greatest ecological disaster in the history of engineering, which led to diverse ecological, biomedical, sociopsychological and economic consequences, eradication of which costs great effort and enormous expense. Of course, the most tragic consequence of the Chernobyl accident is the fate of people exposed to ionizing radiation in the early days after the accident, who were involved in decontaminating structures of the nuclear power plant and living in areas contaminated by radionuclides.

Many scientific disciplines were confronted with problems requiring immediate solution and a search for feasible methods of reducing the hazard caused by radioactive contamination of the atmosphere, naturalwater sources, vegetation, foods and residential buildings. Of course, this applies first of all to problems of radiobiology, as the ones that are linked the most closely to a search for ways and means of maximum reduction of the hazard of exposure to radiation and resulting health impairment. It can be stated without exaggeration that the Chernobyl accident was a very serious trial for radiobiology as a science capable of alleviating the fate of people exposed to this serious ecological radionuclide disaster.

Radioactive emissions after the accident in the power unit of the CNPP [Chernobyl Nuclear Power Plant] were a million times greater than from other accidents with reactors of nuclear power plants, for example, at Three Mile Island. On the territory of the Soviet Union, the total area with cesium-137 contamination in excess of 5 Ci/km^2 (185 GBq/km^2) is about $28x10^3$ km^2. More than 225,000 people live in this area. Cesium-137 contamination of 1 to 5 Ci/km^2 (37-185 GBq/km^2) covers an area of $3316x10^3$ km^2 in the Ukraine alone, and more than 1.2 million people live there. The nature of radioactive fallout is notable for distinct spottiness and, in some places beyond the 30-km zone, there are "spots," where radioactive contamination exceeds several hundred Ci/km^2. It would be wrong to relate the radiation threat to man to cesium-137 alone; since strontium-90 is detected in some places, and cesium-144 is detected in virtually all areas, it is indicative of emission of plutonium isotopes during the accident. On the first few days after the accident, large dose burdens were attributable to radioactive isotopes of iodine; inert gas radionuclides, presence of which in the radioactive cloud caused some levels of inhaled doses, also played a part.

At the early stages after the accident, some of the inhabitants—116,000 in 1986—were evacuated beyond the limits of the severely contaminated territories. However, an extensive population was exposed and is continuing to be

exposed to burdens in excess of the currently approved limits. Thus, the residents of Pripyat received large doses, since they were not evacuated immediately after the explosion at the CNPP. A large group of military personnel, who participated in decontamination of the nuclear plant buildings and nearby territory, were also exposed to doses which, by virtue of the specifics of the decontamination work and complexity of radionuclide contamination in the immediate vicinity of the accident site, could not always be regulated. The group of victims whose thyroid gland was exposed to high radiation doses merits special attention. Let us note that the group numbers more than 150,000 people, including 60,000 children for whom irradiation of the thyroid constitutes a particularly high risk. According to the far from complete data thyroid exposure doses were in excess of 2 Gy in 13,000 children and 8000 adults. Radioactivity in the thyroid region was so high in some children from Pripyat that the dosage attributable to accretion of radioactive iodine could have reached 20 Gy or more.

High levels of radioactive contamination of the soil lead to accumulation of radionuclides, mainly cesium-137 and strontium-90 in foodstuffs. These radionuclides also migrate via trophic chains into livestock products. Living in these areas, particularly rural ones, involves the constant threat of excessive irradiation from external sources. Use of food high contaminated with radionuclides, accumulation radioactivity of ash in houses and yards where twigs or plant residue is used as fuel, penetration of radioactive aerosol particles into the atmosphere during farm work that inevitably produces much dust—all this aggravates markedly the radiological situation in rural areas. Since it is difficult to avoid these sources of additional radiation, substantial restrictions have to be imposed on the nature of customary life: change in utilization of natural resources, limit the time children can spend in the fresh air, forego walks in the forest, to the river, etc. However, the chief way to lower dose burdens is to provide the public with "clean" foodstuffs, i.e., free of radionuclide contamination.

Of course, resettling to other, radiologically clean regions is the most radical means of lowering dose burdens to individuals residing in territories contaminated with radionuclides. However, there are several negative aspects to such a resettlement of inhabitants of a large number of populated settlements, which must be bore in mind. The main one is that compulsory resettlement itself involves acute psychological trauma, disruption of established traditions and ties, moving from a customary zone, etc. It is therefore obvious that, when solving the question of resettlement, one should judiciously weigh the pros and cons of mass scale displacement of people. One must proceed from specific guidelines and concrete quantitative values of exposure doses, quality of life, strict epidemiological data and, of course, economic feasibility which determines the expediency of moving. We are referring here to the so-called "concept of safe habitation of territories contaminated with radionuclides" (subsequently this concept was renamed "concept of acceptable risk" or simply "concept of residing"). Of course, it cannot be considered normal that the formulation of this concept appeared only at the end of the fifth year after the accident; it should have already existed for different type of ecological disasters.

Evidently, one of the most important lessons of the Chernobyl accident is a real assessment of our general lack of preparedness for extreme situations.

Of course, in selecting the permissible level of radiation, which is taken as the basis for making decisions to resettle people, socioeconomic factors play a deciding part. However, it is also extremely important to take into consideration the radiobiological danger to the public that arises in the new anthropogenic radionuclide anomaly around the CNPP. And, of course, with the existing level of understanding of the substance of radiobiological processes, one should proceed from the following prerequisite: *any elevation of radiation dose due to contamination by radionuclides of a residential territory has an adverse effect on human health*, and for this reason it is necessary to implement a set of measures that would lower dose burdens to a level at which the risk to health will not exceed the pre-accident level.

This prerequisite is, in essence, a statement of the ALARA principle. The quantitative measure of the so-called "non-intervention level" is a dose rate of 0.1-1.0 mSv/year. Naturally, the top of this range, 1 mSv/year, was adopted in the concept that is being elaborated at the present time. Of course, several years will be needed to fulfill this condition in a very large territory. For this reason, there has been discussion of the need to use one more limit for dose rates, in excess of which resettlement would be mandatory. No doubt, radiobiology must play the deciding roll in the selection of these doses. At the same time, the conditions that have developed in contaminated regions cannot be reduced to radiation alone, since elevated burdens from other adverse factors have been found in the contaminated region. For this reason, the health parameters of the public are such that one must think of the synergistic effects of radiation and other factors.

Thus, a rise in incidence of various diseases has been noted everywhere in the regions contaminated by radionuclides. The negative deviations in health status of the public are recorded in the form of diseases that one usually does not relate to radiation level. For example, there has been a distinct rise in ischemic heart disease, hypertensive disease, peptic ulcers, strokes and nervous diseases. At the same time, there has been a rise in diseases that can be directly related to radiation: hyperplasia and carcinoma of the thyroid, malignant neoplasms, leukemia, cataract. In addition, there has been an increase in incidence of chronic bronchitis, and general aggravation of infectious diseases. Unfortunately, we do not yet have full or reliable enough epidemiological data, and conclusions are made on the basis of mass-scale observations of physicians who work in radionuclide-contaminated regions. Nevertheless, one should pay very much attention to evaluation of the health status of people exposed to radiation, so that everything that is possible can be done to attenuate the

adverse effects on health of the specific conditions that have developed in the anthropogenic radionuclide anomaly.

Of course, adoption of the residence concept should take into consideration worsening of the health status of the public in these 5 years.

A number of problems covering virtually all branches of modern radiobiology acquired particular importance after the CNPP accident because of their direct bearing on taking actual steps to protection of the public's health.

It is particularly important to carry out research in radioecology, since the contaminated region is very distinctive with regard to biogeochemical landforms. We need a radioecological evaluation of the situation that has developed because of the temporary burial of radioactive materials and soil in the 30-km zone. It is also necessary to assess the fate of strontium-90 flushed from river deposits in the accident region into the Dnepr River and then carried along with irrigation water to the soil of irrigated lands of southern Ukraine.

Research in radiation immunology is extremely important, since worsening of immune status has been found in vast populations exposed to relatively low chronic dose burdens. It is also imperative to give more attention to investigations in the area of radiation carcinogenesis, since chronic exposure to extremely low doses leads to activation of carcinogenetic processes in experimental animals in regions with radioactive fallout.

Naturally, there has been dramatic increase in the need for investigation of the effects of exposure to low doses of radiation, determination of the nature of dose-radiobiological effect ratios with exposure to very low doses and, of course, objective assessment of risk coefficients. The problem of synergism between the effects of chronic irradiation and nonradiation factors has acquired special importance.

Since the main danger of radiobiological effects for many people is related to chronic exposure, it is very important to investigate the effects of radioprotective agents, the efficacy of which is manifested by the coefficient of risk of stochastic effects. In this regard, investigation of the mechanisms of regulation of the types of DNA repair that are related to recombination processes merits attention. At the same time, it has grown very important to investigate the means of lowering radionuclide assimilation when people consume contaminated foodstuffs. We need to return once more to assessment of the hazard of "hot particles" contained in the dust of the aerosol part of air in territories contaminated by radionuclides.

At the end of the fifth year after the CNPP accident there are still many concerns and heightened alarm about the fate of the victims, and radiobiologists must play a very responsible role in solving the problems that have arisen, since expressly this discipline can serve as a reliable conduit in finding the recourse for mankind in case of a nuclear disaster with the least detriment to the health of the people. One of the lessons of the Chernobyl accident is that a high level of basic radiobiological research must be maintained as the theoretical basis that determines the success of man's actions at the stressful moment of an ecological disaster.

Soviet-Chinese Cooperation in Veterinary Medicine

927C0116A Moscow ZEMLYA I LYUDI in Russian
No 25, 21 Jun 91 p 7

[Article by V. Maryasov: "Convention Signed"]

[Text] The border between the USSR and the People's Republic of China is thousands of kilometers long. Border trade is successfully developing in many places along the border, and there are tourist exchange groups. Conditions of the progressive development of relations between our countries necessitate taking measures to prevent the spread of infectious diseases of animals during transport and in the transportation of products and raw materials of animal origin and feed.

In this connection a convention was developed between the governments of the USSR and China for cooperation in the field of animal quarantine and veterinary science which was recently signed by the USSR Minister of Agriculture and Produce V. I. Chernoivanov and plenipotentiary Ambassador of China Yui Khunlyan. The convention outlines the development of respective rules for import and export and periodic exchange of information and specialists.

The signing of the convention for cooperation in animal quarantine and veterinary science is an important step in the development of relations between two great neighbors.

Eighth Congress of Internists of Belorussian SSR

927C0005C Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 91 pp 70-72

[Article by V.P. Sytyy, V.K. Milkamanovich, Minsk]

UDC 615:061.3(476)

[Excerpt] The Eighth Congress of Internists of Belorussian SSR took place 20 and 21 December 1991, in Minsk. A total of 325 delegates from various corners of the republic took part in the work of the congress. The congress studied issues involving the organization of the care provide the population of the republic in terms of internal medicine, plus current problems of gastroenterology.

BSSR Minister of Health V. S. Kazakov spoke to those present. He noted that the rapid change taking place in the sociopolitical and economic situation in the republic requires a more effective management of the operations of treatment-and-prevention facilities. Success in the perestroyka of the republic's health care sector can be achieved with the introduction of new forms of work relations that give medical workers a material stake in the outcomes of their work. It was emphasized that prophylactic medical care is being increased and that the stress is shifting to the outpatient polyclinic component, with the quality of hospital care being improved. The mechanism must be flexible enough to match the structure and activity of health care facilities to the actual needs of the population.

V. S. Kazakov also spoke on the Chernobyl problem. The BSSR Ministry of Health and local health care organs have been gearing their work toward the solution of the following problems: permanently monitoring radiation levels and doing everything possible to assist in lowering the levels of radiation to which the population is exposed; performing mass health screening of the population and organizing effective measuring for recovery; creating an All-Union Control Register for continuing observation of the health of people who were exposed to radiation; improving the material-technical base of the health care sectors of Mogilev and Gomel oblasts; conducting scientific research for the purpose of studying the biomedical effects of the Chernobyl accident and to develop measures to prevent such effects; and performing explanatory work and health education among the populace.

An in-depth, continuing examination of children and adults has identified a worsening trend in a number of health indices among the populace living in the areas under strict control. The number of thyroid disease has increases, as has the number of cases of anemic syndrome in pregnancy. Morbidity has risen among newborns as a result of hypoxic states, respiratory disorder syndrome, and perinatal infections. Among adults, an increase by a factor of 2-4 has been noted for nervous diseases, arterial hypertension, ischemic heart disease, diabetes, and chronic pulmonary diseases.

Deputy Minister N. I. Stepanenko directed the delegates' attention to the social status of the residents of our republic and focused their attention on the new economic mechanism in health care, which is an intermediate stage to insured medicine.

The paper given by K. N. Anishchenko and G. P. Matveykov was devoted to new forms of outpatient polyclinic care for internal medicine patients. As of 1 January 1990, a total of 121 permanent home-care facilities and 100 day hospitals were in operation in Belorussia. Day wards were opened in 54 hospital facilities, and 42 departments for rehabilitation treatment were set up, as were 116 preventive departments. Day hospitals, as a rule, were opened in modern outpatient prevention-oriented facilities with large departments for rehabilitation treatment that make wide use of nondrug treatment methods: physiotherapy, therapeutic physical exercise, magnetotherapy, acupuncture/reflexotherapy, acupressure, speleotherapy, laser treatment, ultrasound treatment, barotherapy, phytococktails, and therapeutic respiratory exercises developed by K. P. Buteyko.

In Mogilev, a center for rehabilitation treatment has been operating successfully for many years at a physiotherapy polyclinic.

The chief internist of the Grodno Oblast Health Department, G. A. Prokopovich, reported that two main types of home-care facilities are in operation in the oblast: centralized facilities, where the patients are serviced by specially selected medical workers, and decentralized facilities, where the patients are serviced by a district physician and a nurse. The second type, provides higher-quality medical care, because it does not violate the district principle.

The paper written by G. P. Matveykov *et al.* noted that in the republic, diseases of the digestive organs rank 7th among the causes of temporary disability and primary egress to disability and 5th among the causes of death. In BSSR in 1989, people presented to polyclinics with digestive organ disease at a rate of 74.9 per 1,000 adults and adolescents. Gastritis and duodenitis rank 1st among such patients (32.8 percent), diseases of the liver and gall bladder rank 2nd (25.8 percent), and peptic ulcer of the stomach and duodenum rank 3rd (11.0 percent).

In terms of presenting rates, peptic ulcer of the stomach and duodenum rose to 148.5/100,000 population (1989) from 81.7 (1980).

There has been no drop in mortality from gastroenterologic pathology. The authors of the report feel that more attention needs to be devoted to preventive measures and that the number of gastroenterology offices in polyclinics needs to be expanded and the network of gastroenterology beds enlarged. In large cities, interrayon endoscopic departments should be created, wider use should be made of diagnostic centers, and staged treatment—polyclinic/hospital/sanatorium (sanatorium-prophylactorium)—should be used.

Many papers involved etiopathogenesis and diagnostics of peptic ulcer and diseases of the liver and bile ducts. [passage omitted]

International Symposium on Blood Purification

927C0113B Moscow IZVESTIYA in Russian 8 Jul 91 Union ed. p 2

[Article by S. Tutorskaya: "Following the Procedures of Frezenius"]

[Text] Blood purification problems were discussed at a symposium attended by prominent foreign scientists and organized by the All-Union Center for Clinical Diagnosis of the Ministry of Health and the well known German company Frezenius.

Scientists from different cities of our country, as well as from France, Italy, the FRG, the USA, England and Austria, came here to share accumulated experience and determine the future prospects of treating patients by purifying blood of toxic metabolic products, poisons (in poisoning cases), and pathogenic complexes formed in the body in response to certain pathological processes.

This area of medicine would simply be unable to exist without modern technical accomplishments, which just half a century ago were in the realm of science fiction.

Modern blood cell separators, in which the blood of a patient is separated into individual components, have become a permanent fixture in progressive, well-equipped clinics. If some of these components must be removed—for example if there is an excess quantity of thrombocytes, such that vascular thrombosis occurs, then this is what they do. And the purified blood, which no longer is a threat to life, is returned to its owner. This is but one example of the possibilities of "invisible blood surgery." Recently scientists in our country and abroad have learned to remove atherogenic fractions of cholesterol responsible for sclerosis of the vessels from the blood of seriously ill patients. Experience exists in providing relief to patients with diffuse sclerosis by removing pathogenic substances from blood. Wide use is being made of plasmapheresis, in which blood plasma is first separated and purified, and then returned to the bloodstream. There is less trauma to blood corpuscles as a result.

The symposium's participants visited the center's clinic, where they saw children 9-14 years old suffering from a severe hereditary form of hypercholesterolemia. After a series of blood purification sessions, the state of the children improved.

All of this is possible only with absolutely reliable equipment, with complete sterility of solutions and disposable blood transfusing systems, with cleanliness of all instruments used by the doctor and nurse. And naturally, with personnel of high qualifications. The center will soon open a school which will train our doctors and nurses in the new treatment procedures.

The symposium's participants noted the high reliability of the dialyzers, separators and other equipment of Frezenius and of a number of other Western companies. Which is something we can't say, unfortunately, about our own products: There are a few isolated models that work well, but there are no dependable products manufactured on a large scale.

And because seriously ill patients can't wait (only 3-4 percent of those in our country who need constant dialysis get it), we must help them right away. IZVESTIYA recently carried an article about the Belorussian city of Borisov, which is building the first plant (another of the same kind will be built in Kursk in a while) at which personnel trained at Frezenius will manufacture a million dialyzers annually using that company's procedure.

This will be the beginning of a return to the 20th century by a country whose scientists had earlier been the first in the world to create blood transfusion apparatus. We need to catch up with medicine in other countries. So that both equipment and experienced personnel would be available not just in a few progressive clinics but in all large clinics.

"It was very interesting to participate in the discussions," said Professor G. Lange, a German scientist. "Your doctors talked for example about the difficult work after the earthquake in Armenia. There was a great need for dialysis equipment. But there are simpler devices for removing impurities from blood as well; they have been designed in the West, and in those conditions they could have saved a few more lives. We must all learn to help the suffering. Both in the clinic, and right at a disaster site. Providing 20th-century help is our sacred duty."

Non-Linear Neuroelectrodynamics of Cell and Design of Neurostructure Information Models

927C0094A Kiev KIBERNETIKA I VYCHISLITELNAYA TEKHNIKA. VYPUSK 86. MEDITSINSKAYA KIBERNETIKA in Russian 1990 pp 1-9

[Article by G.B. Bogdanov]

UDC 681.142.35:1

[Abstract] This article reviews the status of non-linear neuroelectrothermodynamics of the cell from a neurophysiology standpoint to explain the mechanism of neuroexcitability and neurofrequency function on the basis of a non-linear neuroelectric concept. Among the points discussed in the article are the average neurofrequency as a carrier of signal neuroenergy and the design of neurostructure information models. It is believed that the biophysical fundamentals of the non-linear neuroelectrothermodynamics of the nerve cell were sufficiently developed to make it possible to scientifically combine them with known positions of biophysics, neurocybernetics, neurobionics, biomolecular electronics, and neurophysiology. Figures 2; references 13 (Russian).

ISIDDA Medical Information System

927C0094B Kiev KIBERNETIKA I VYCHISLITELNAYA TEKHNIKA. VYPUSK 86. MEDITSINSKAYA KIBERNETIKA in Russian 1990 pp 26-30

[Article by N.L. Proshchenko and N.N. Dolgopolov]

UDC 621.391:61

[Abstract] This article discusses the principles and objectives of the development of medical information systems to gather, sort, and evaluate results in view of the developing problem of new knowledge surpassing the ability of science to use it. The purpose of developing medical information systems (data bases) is to organize and automatize work for the collection and processing of information in medicine and public health. ISIDDA (information systems for instrumental diagnosis of diabetes) is an information system with eight software programs that monitors the condition. The purpose of this investigation was to develop a tri-level medical automated system for mass screenings and research in the field of diabetology. The first level is used to identify individuals at risk for diabetes. The second level determines the extent of carbohydrate metabolism impairment, while the third level concerns dynamic observation of diabetics. References 8 (Russian).

Mathematical Simulation of Drug Effects Using Theory of Markov Processes

927C0094D Kiev KIBERNETIKA I VYCHISLITELNAYA TEKHNIKA. VYPUSK 86. MEDITSINSKAYA KIBERNETIKA in Russian 1990 pp 86-89

[Article by V.P. Solovyev, N.V. Odrekhivskiy, and A.S. Kovalenko, Cybernetics Institute imeni V.M. Glushkov, Ukrainian SSR Academy of Sciences, Kiev]

UDC 577.3:539.12.04

[Abstract] The objective of this study was to describe the pharmacodynamics of preparations using mathematical and software resources for simulation. The basis for this is the hierarchal concept of the structure of a living organism. One of the arguments favoring this approach is the fact that a reaction to a drug involves elementary biochemical reactions. The processes in the hierarchal diagram of the structural levels of a hypothetical model of a living organism can be described using the theory of Markov processes with the help of a system of differential equations. This approach to drug simulation is well-suited for low effect concentrations. The software is written in Pascal to be used on an SM computer with an RAFOS operation system. In conclusion, this mathematical and software program makes it possible to simulate drug effects on the body with the purpose of monitoring the quality of treatment. This program may also be used in an automated training system. Figures 2; references 5 (Russian).

END OF FICHE

DATE FILMED

5 May 92